

xeCJK Macro Package

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Section 1 Introduction

xeCJK is an X_YL^AT_EX macro package for typesetting Chinese, Japanese and Korean (CJK) characters. Main functions.

1. Setting CJK and English fonts respectively.
2. Automatically ignore spaces between CJK characters and keep other spaces, allowing line breaks between non-punctuated Chinese characters and English letters (a - z, A - Z).
3. (b) Multiple punctuation treatments are available: full, half, open, end-of-line half and CCT.
4. Automatically adjust the space between Chinese and English.

xeCJK uses some of the latest features of X_YL^AT_EX and requires X_YL^AT_EX 0.9995.0 (2009/06/29) or later. xeCJK relies on the L^AT_EX3 project's l3kernel and l3packages. xeCJK relies on the L^AT_EX3 project's macro package suite l3kernel and l3packages. xeCJK also needs to call system fonts via fontspec macro package. xeCJK will load these macro packages automatically as needed.

The original author of xeCJK is Wenchang Sun, and the macro package has been included in the ctex-kit project for maintenance since May 2009, and the current main maintainers are Ocean Liu and Qing Li.¹ and Qing Li² The main maintainers are currently Ocean Liu and Qing Li.

Section 2 Basic Usage

As with other LATEX macro packages, the introduction of the xeCJK macro package is simply a matter of using the

```
\usepackage{xeCJK}
```

* [ctex-kit rev. c4ccfae](#).

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After introducing the `xeCJK` macro package, you can use CJK characters in documents by setting the font of CJK characters. You can use `xeCJK` macro package in

Exam

```
\documentclass{article}
\usepackage{xeCJK}
\setCJKmainfont{SimSun}

\begin{document}
Chinese \LaTeX example.
\end{document}
```

various document classes, the simplest example is

The above example sets the Chinese font `SimSun` (宋体). To run this example, the system must have the set font installed, the source file is saved in UTF-8 encoding and compiled using `XELATEX`.

`xeCJK` only provides basic CJK language support such as font and punctuation control. For Chinese documents, you can use higher

It will automatically call `xeCJK` and set up Chinese fonts, and provide further localization support. For more details, please refer to the description of [ctex macro package](#).

`xeCJK` provides a lot of options that can be set as macro package options when macro package is called or with `\xeCJKsetup` command, see section 3.1 for details. Besides the `\setCJKmainfont` command, `xeCJK` also provides many other commands to set and select Chinese fonts, see section 3.2 for details. Other more detailed functions will also be explained in detail below. There are also some examples in the `example` directory of the folder where this document is located.

Section 3 User Manuals

3.1 Macro Package Options

`xeCJK` provides macro package options in the form of `<key>=<var>`. You can set these options directly when calling the macro package, or use `\xeCJKsetup` to set these options after calling the macro package. `xeCJK` internally calls the `fontspec` macro package, and you can use its macro package options when calling `xeCJK`. `xeCJK` will pass the `fontspec` options to it.

`\xeCJKsetup` `\xeCJKsetup {<key1>=<val1>, <key2>=<val2>, ...}`

where `<key1>`, `<key2>` are setting options, and `<val1>`, `<val2>` are the set contents of the corresponding options. Multiple options can be set in a single statement. For

Exam

```
\usepackage[PunctStyle=kaiming]{xeCJK}
```

example

Equivalent to

Exam

```
\usepackage{xeCJK}
-----
\xeCJKsetup{PunctStyle=kaiming}
```

Options or commands marked with `*` or `|` can only be used in the introductory area, where `|` also means that this option or command only affects the

subsequently defined **CJK** fonts. The rest of the options or commands without special markings can be used in the introductory area or in the body of the text if not otherwise specified. Bold indicates the default setting of **xeCJK**.

LocalConfig \star LocalConfig = {(true|false|name)}

New: 2012-11-22 Whether to use the local configuration file `xeCJK-(name).cfg`. `(name)` can be any string that makes the file name legal without spaces. If set to `true`, `xeCJK.cfg` is used; if set to `false`, the configuration file is not loaded. You can save some settings for `xeCJK` that will be described below (such as setting common CJK fonts, modifying character ranges, defining new punctuation output formats, etc.) to the file `xeCJK-(name).cfg`. Then put this file in the appropriate location in the local TDS directory. Users using TEX Live can create the following new directory and then put `xeCJK-(name).cfg` in it.

`texlive/texmf-local/tex/xelatex/xecjk`

Finally, you need to run `mktextlsr` at the command line to refresh the filename database so that the TEX system can find it.

Please note that only the above `LocalConfig` option in the `xeCJK` macro package needs to be set when calling `xeCJK`, and cannot be set by `\xeCJKsetup`.

xeCJKactive `xeCJKactive = (true|false)`

Turn **on/off** special handling of Chinese. In fact, this option turns on/off the entire character class mechanism of X_YTEX, and macro packages that rely on this mechanism are affected.

CJKspace `CJKspace = (true|false)`

By default `xeCJK` will ignore the spaces between CJK characters, use this option to keep the spaces between them.

CJKmath \star `CJKmath = (true|false)`

Updated: 2016-05-04 Whether to support inputting CJK characters directly in the math environment. With this option, you can output CJK characters directly in the mathematical environment. `url` macro package puts a URL in a special mathematical environment, so if there are Chinese characters in the path parameter of commands like `\path`, you need to enable this option for the Chinese characters in the path to be displayed.

CJKglue `CJKglue = {\hskip 0pt plus 0.08\baselineskip}`

Set the **glue** inserted between CJK text, the above is the default value of `xeCJK`. Generally speaking, unless there is a special need (for example, to change the text spacing, etc.) no need to set this option, and the default value can be used. If you want to set this option, it is better to set the **glue** with some flexibility for the sake of line end alignment.

CJKecglue `CJKecglue = {(glue)}`

Set the spacing between CJK text and Western text, and between CJK text and in-line math formulas. The default value is one space. The `(glue)` set using this option should preferably be set with some flexibility as well. Please note that the `(glue)` set here only affects the spaces automatically added by `xeCJK` as needed, the spaces between the CJK text directly entered in the source file and the western text are not affected (direct output). Sometimes `xeCJK` may not be able to adjust the spacing correctly, and you need to add spaces manually.

xCJKecglue `xCJKecglue = {(true|false|glue)}`

By default `xeCJK` does not adjust the spaces between the CJK text directly entered in the source file and the western text, if you need to adjust, please use this option. If you use this option, it will use `CJKecglue` to replace the space between the CJK text directly entered in the source file and the western text.

CheckSingle `CheckSingle = {true|false}`

Updated: 2013-06-26 Whether to avoid a single **CJK** text to occupy the last line of a paragraph alone. It should be noted that this option can only correctly handle the problem of handling lone words if the last word at the end of the paragraph is **CJK** text or punctuation and the penultimate and third words are both text. If these penultimate three words have parameters that are used as control sequences, then generally speaking they cannot be handled correctly either.

WidowPenalty `WidowPenalty = {{penalty|10000}}`

New: 2015-04-08 After using the **CheckSingle** option, the **penalty** between the three characters at the end of the paragraph is set. the initial value is **10 000**, i.e. the line break between them is prohibited.

PlainEquation PlainEquation = \langle true|false \rangle

New: 2012-12-06 If you are using the $\$ \$ \dots \$ \$$ form to enter interlinear math formulas, this option needs to be enabled so that the **CheckSingle** option is recognized correctly. It is recommended to use $\backslash[\dots \backslash]$ to enter interlinear math formulas.

NewLineCS NewLineCS = $\{ \backslash par \backslash []$

NewLineCS+ Set the control sequence that causes line breakage so that the **CheckSingle** option can
NewLineCS- recognize it correctly. The above is the initial setting of **xeCJK**.

New: 2012-12-04

EnvCS EnvCS = $\{ \backslash begin \backslash end \}$

EnvCS+ Set the control sequence for the start and end of the LATEX environment so that the **CheckSingle**
EnvCS- option can be recognized correctly. The above is **xeCJK**

The initial settings of 2012-12-04

New:

InlineEnv InlineEnv = $\{ \langle env_1 \rangle, \langle env_2 \rangle, \langle env_3 \rangle, \dots \}$

InlineEnv+ When using the **CheckSingle** option **xeCJK** will start the LATEX environment after the
InlineEnv- CJK text $\backslash begin \{ \dots \}$

and $\backslash end \{ \dots \}$ is considered a line break, if there are some special LATEX environments that do not cause line breaks, you can use this

Updated: 2012-12-06

The **CheckSingle** option is used to declare it so that **CheckSingle** will recognize it correctly.

AutoFallback AutoFallback = \langle true|false \rangle

When there are individual rare words in the document, you can use this option to automatically output these rare words using the pre-set backup fonts. How to set the fallback fonts will be described in Section 3.2.

AutoFakeBold * AutoFakeBold = $\{ \langle$ true|false|number $\rangle \}$

Global set whether to use pseudo-bold when no corresponding bold is declared; when the input is a number, pseudo-bold will be used and the number entered will be used as the default boldness level for pseudo-bold.

AutoFakeSlant * AutoFakeSlant = $\{ \langle$ true|false|number $\rangle \}$

Globally sets whether to use pseudo-slant when no corresponding slant is declared; when the input is a number, the pseudo-slant will be used and the number entered will be used as the default slant level for the pseudo-slant. The range of values for the slant degree is $[-0.999, 0.999]$.

EmboldenFactor * EmboldenFactor = $\{ \langle$ number|4 $\rangle \}$

Set the default thickness of the pseudo-bold.

SlantFactor * SlantFactor = $\{ \langle$ Number|0.167 $\rangle \}$

Sets the degree of slant of the pseudo-slant in the range $[-0.999, 0.999]$.

PunctStyle PunctStyle = $\{ \langle$ quanjiao|banjiao|kaiming|hangmobanjiao|CCT|plain|... $\rangle \}$

Updated: 2012-11-10 Set the punctuation processing format. **xeCJK** has a predefined format of

quanjiao Full angle: all punctuation occupies one character width, two adjacent punctuation occupies 1.5 characters width.

banjiao Half-angle style: all punctuation occupies half the width of a Chinese character.

kaiming Open-ended: full angle for the dot at the end of the sentence, half angle for the rest.

hangmobanjiao end-of-line half-angle style: all punctuation occupies a Chinese character width, and the beginning and end of the line are aligned.

CCTCCT format: the width of all punctuation marks is slightly less than the width of one Chinese character.

plain As is (without adjusting the punctuation spacing)

You can use `\xeCJKDeclarePunctStyle` introduced in 3.5.2 to define a new punctuation format.

PunctFamily `PunctFamily = {false|family}`

New: 2018-01-24 By default, the font of CJK punctuation marks is consistent with the CJK body text.

PunctFamily is used to set the font for punctuation marks separately. `<family>` needs to be predefined using `\setCJKfamilyfont` or `\newCJKfontfamily` as explained later. `false` means to cancel the effect of this option and make the punctuation font consistent with the body text.

KaiMingPunct * **KaiMingPunct** = {{ . ?!}}

KaiMingPunct+ * sets the end-of-sentence dot in the **kaiming punctuation** format, with the + and - following **KaiMingPunct** indicating the dot at the end of the sentence from which the

Some enlightened sentences add or subtract punctuation at the end of the dot.

LongPunct * **LongPunct** = {{ -— ……}}

LongPunct+ * Sets long punctuation, such as the dash “—” and the ellipsis “……”, allow line breaks before and after long punctuation, but prohibit line breaks before and after them.

Intermittent rows.

MiddlePunct * **MiddlePunct** = {{ -----~ = ~}}

MiddlePunct+ * Set the centered punctuation, such as the spacer “-”. For the centered punctuation between CJK text, **xeCJK** will set the centered punctuation according to different

The formatting of the punctuation is adjusted to ensure that the space between the centered punctuation and the text before and after it is centered. For a centered punctuation point appearing at the end of a line on , line breaks after it are allowed, but line breaks before it are prohibited.

PunctWidth * **PunctWidth** = {(length)}

By default, **xeCJK** will automatically calculate the width occupied by the punctuation according to the chosen punctuation processing format, if you are not satisfied with the default setting, you can change it by this option. In order to make the width occupied by the punctuation point adapt to the change of font size, it is better to use relative distance units such as **em** for the unit of **length** set here, and it is not recommended to use absolute distance units such as **pt**. This setting can be used for all punctuation formats **except plain**. Also, the setting here is valid for all CJK punctuation, if you just want to set some of them, please use `\xeCJKsetwidth` in section 3.5.1.

PunctBoundWidth * **PunctBoundWidth** = {(length)}

New: 2013-08-22 Similar to the above option, but sets the width of punctuation marks when they appear at the beginning/end of a line.

AllowBreakBetweenPuncts **AllowBreakBetweenPuncts** = (true|false)

By default, **xeCJK** forbids line feeds between adjacent CJK right markers and CJK left markers, you can use this option to change the setting of .

RubberPunctSkip **RubberPunctSkip** = (true|false|plus|minus)

Updated: 2016-05-13 By default, the spacing before/after the punctuation mark is somewhat flexible. It can be stretched to the original border width and contracted to the border width on the other side of the punctuation mark. Setting this option to **plus** will only allow elongation; setting it to **minus** will only allow contraction. Setting to **false** will disable this feature, making the **front/back spacing** a fixed value.

CheckFullRight **CheckFullRight** = (true|false)

New: 2012-12-02 Some control sequences require that a line cannot be broken before it. However, by default, a single full-corner right-point can always be followed by a line break. Therefore, when these control sequences appear after a full-right point, an unexpected line break may occur. This option can be used at to avoid this situation.

NoBreakCS **NoBreakCS** = { \footnote \footnotemark \nobreak }

NoBreakCS+ **NoBreakCS-** Set the control sequence that cannot break a line after a full-corner right marker. The above are the default settings of **xeCJK**. If these control sequences are set in

only a few occurrences in the document, and instead of using the `CheckFullRight` option, you can manually prefix these control sequences with

The `\xeCJKnobreak` is introduced in Section 3.7.

Verb `Verb = <true|false|env|env+>`

Updated: 2012-11-16 `true` means the spacing between Chinese and English is not automatically adjusted in the `\verb` command or `verbatim` environment. `env` option automatically calculates the spacing between Chinese and Chinese in the `verbatim` environment to keep the code aligned; `env` option does not adjust the spacing in `\verb`, `env+` option also applies the spacing set in option also applies the spacing set in the main text to `\verb`. This option is useful for using to

The `\verbatim@font` command is valid in all cases. For more general cases, you can use the `\xeCJKVerbAddon` introduced in Section 3.7. `false` means no processing is done. The values of the above options, **except false**, prohibit automatic line feeds between Chinese characters and between Chinese characters and Western languages.

LoadFandol * `LoadFandol = <true|false>`

New: 2014-03-01 Whether to use **Fandol** fonts when there is no CJK font set in the introduction area. If this option is enabled, you need to install **Fandol**

Font Series.

3.2 Font settings and selection

`\setCJKmainfont` * `\setCJKmainfont {font name}[font features]` or
`\setCJKmainfont [font features] {font name}`

Updated: 2016-11-18

Sets the CJK font for the body Roman family, affecting the fonts of `\rmfamily` and `\textrm`. The last two parameters are inherited from the `fontspec` macro package, `{font features}` denotes font property options, and `{font name}` is the font name. The font name can be either the family name or the file name of the font, see section 3.2.1 for finding the font name; see the documentation of the `fontspec` macro package for available font attribute options. It should be noted that `xeCJK` has modified the `AutoFakeBold` and `AutoFakeSlant` options to match the global pseudo-bold and pseudo-italic settings.

For compatibility reasons, the font attribute options can be placed either in front of or behind the font name. If the options are placed after, there should be no space or line break between the font name and the options.

`AutoFakeBold` `AutoFakeBold = {true|false|number}`
`AutoFakeSlant` `AutoFakeSlant = {true|false|number}`

Locally set the pseudo-bold and pseudo-skew properties of the current font family. If these options are not given locally, the global settings will be used.

`Mapping` `Mapping = {(fullwidth-stop|full-stop|han-trad|han-simp|...)}`

New: 2013-06-07

`xeCJK` provides the above four **TECKit mapping** files, and you can use them through the `Mapping` option when setting fonts. Among them, `fullwidth-stop` is used to convert the normal period "." into a full-width solid period "．". `han-trad` is used to convert Simplified Chinese to Traditional Chinese, `han-simp` is used to do the opposite. It is important to note that the conversions are simple mechanical word-for-word translations, which cannot be completely accurate, so be careful when using them. For example, if the simplified Chinese words "play" and "hair" are converted into the traditional Chinese words "play" and "head hair", it is obvious that the latter should be used as "hair". It is also possible to create new mapping files according to actual needs, please refer to TECKit's documentation.

`\setCJKsansfont` * `\setCJKsansfont {font name}[font features]` or
`\setCJKsansfont [font features] {font name}`

Updated: 2016-11-18

Set CJK fonts for body sans-serif family, affecting `\sffamily` and `\textsf` fonts.

`\setCJKmonofont` * `\setCJKmonofont {font name}[font features]` or
`\setCJKmonofont [font features] {font name}`

Updated: 2016-11-18

Set CJK fonts for the body-width family, affecting `\ttfamily` and `\texttt` fonts.

`\setCJKfamilyfont` * `\setCJKfamilyfont {<family>} {font name}[font features]` or
`\setCJKfamilyfont {<family>} [font features] {font name}`

Updated: 2016-11-18

Declare the new CJK font family `<family>` and specify the font.

`\CJKfamily` `\CJKfamily {<family>}`
`\CJKfamily + {<family>}`
`\CJKfamily - {<family>}`

Updated: 2012-10-27

Used to switch CJK font families in documents, `<family>` must be declared in advance. `\CJKfamily` is valid only for CJK character classes.

`\CJKfamily+` is valid for all character classes, `\CJKfamily-` is valid for non-CJK character classes. When `\CJKfamily+` and

If the parameter of `\CJKfamily-` is empty, the current CJK font family will be used.

`\newCJKfontfamily` * `\newCJKfontfamily [<family>] \<font-switch> {font name}[font features]` or

Updated: 2016-11-18

`\newCJKfontfamily [⟨family⟩] \⟨font-switch⟩ [⟨font features⟩] {⟨font name⟩}`

Declare the new CJK font family `⟨family⟩` and specify the font, and define `\⟨font-switch⟩` which can be used to switch the CJK font family in the document. It is not necessary to specify `⟨family⟩`, in this case `⟨family⟩` will be equal to `⟨font-switch⟩`.

In fact, `\newCJKfontfamily` is a merge of `\setCJKfamilyfont` and `\CJKfamily`. For example

Exam

`\newCJKfontfamily[song]\songti{SimSun}`

Equivalent to

Exam

```
\setCJKfamilyfont{song}{SimSun}
\newcommand*\songti{\CJKfamily{song}}
```

\CJKfontspec \CJKfontspec *{font name}*[*font features*] or
 \CJKfontspec [*font features*] *{font name}*

Updated: 2016-11-18

Define a new CJK font family in the document and use it immediately.

\defaultCJKfontfeatures * \defaultCJKfontfeatures *{font features}*

Globally set the default options for CJK font family. For example, using

Exam

```
\defaultCJKfontfeatures{Scale=0.962216}
```

You can reduce all CJK fonts to 0.962216. The initialization settings of `xeCJK` macro package are

```
\defaultCJKfontfeatures{Script=CJK}
```

\addCJKfontfeatures \addCJKfontfeatures *{font features}*

Updated: 2013-06-30

```
\addCJKfontfeatures * {font features}
\addCJKfontfeatures [block1, block2, ...] {font features}
\addCJKfontfeatures * [block1, block2, ...] {font features}
```

Temporarily add options for the currently used CJK fonts. The first command is valid only for the fonts of the current CJK main partition; the second one is valid for the fonts of both the main partition and other partitions; the third one is valid only for the

Exam

```
\addCJKfontfeatures{Scale=1.1}
```

partitions specified in the optional parameter; the fourth one is valid for the main partition and the partitions specified in the optional parameter. For example, using

You can enlarge the CJK main partition font currently used in the document to 1.1.

\CJKrmdefault Save the CJK font family used by `\textrm` and `\rmfamily`, the default value is `rm`.

The CJK font family used by `\CJKsfdefault` save `\textsf` and `\sffamily`, default value is `sf`.

\CJKttdefault Save the CJK font family used by `\texttt` and `\ttfamily`, default value is `tt`.

\CJKfamilydefault stores the CJK font family used by `\textnormal` and `\normalfont`. Similar to `\familydefault` for Western fonts.

Updated: 2013-01-01

The initial value is `\CJKrmdefault`. If it is not modified in the introductory area, `xeCJK` will automatically update `\CJKfamilydefault` at the end of the introductory area according to the western fonts. Therefore use

```
\renewcommand\familydefault{\sfdefault}
```

Then you can change both CJK and Western default fonts to sans serif font family in the whole text.

\setCJKmathfont * \setCJKmathfont *{font name}*[*font features*] or
 \setCJKmathfont [*font features*] *{font name}*

Updated: 2016-11-18

Set the CJK font family in the math formula. If the `CJKmath` option is used, but `\setCJKmathfont` is not used

If you set CJK font in mathematical formula, then `\CJKfamilydefault` will be used as the CJK

`\setCJKfallbackfamilyfont *` `\setCJKfallbackfamilyfont {<family>} {} []` or
`\setCJKfallbackfamilyfont {<family>} [] { }`

Updated: 2016-11-18

Set alternate fonts for the CJK font family `<family>`. For example, using

Exapl
e 8
<pre>\setCJKmainfont{SimSun} \setCJKfallbackfamilyfont{\CJKrmddefault}{SimSun-ExtB}</pre>

`SimSun-ExtB` can be used as an alternate font for `SimSun`.

FallBack `FallBack = [] { }`

`xeCJK` has added `FallBack` option in ``. It is used to set the alternate font at the same time when declaring the main font. For example, the above example is equivalent

Exapl
e 9
<pre>\setCJKmainfont[FallBack=SimSun-ExtB]{SimSun}</pre>

to

If the `FallBack` value is empty, the alternate font will be set. For example

Exapl
e 10
<pre>\setCJKmainfont[FallBack,AutoFakeBold,Scale=.97]{SimSun-ExtB}</pre>

Equivalent to

Exapl
e 11
<pre>\setCJKfallbackfamilyfont{\CJKrmddefault}[AutoFakeBold,Scale=.97]{SimSun-ExtB}</pre>

`\setCJKfallbackfamilyfont *` `\setCJKfallbackfamilyfont {<family>}`

Updated: 2013-06-30

```
{
  [ <font features1 > ] { <font name1 > } ,
  [ <font features2 > ] { <font name2 > } ,
  -----
} [ <common font features > ] or
\setCJKfallbackfamilyfont {<family>} [ <common font features > ]
{
  [ <font features1 > ] { <font name1 > } ,
  [ <font features2 > ] { <font name2 > } ,
  -----
}
```

`\setCJKfallbackfamilyfont` can also be used to set alternate fonts for multiple layers. For example, using

Exapl
e 12
<pre>\setCJKmainfont[AutoFakeBold,AutoFakeSlant]{KaiTi_GB2312} \setCJKfallbackfamilyfont{\CJKrmddefault}[AutoFakeSlant] { [BoldFont=SimHei]{SimSun} , [AutoFakeBold] {SimSun-ExtB} }</pre>

After that, `SimSun` is set as the alternate font of `KaiTi_GB2312`, and `SimSun-ExtB` is the alternate font of `SimSun`. If the current font family is missing and there is no alternate font, try to use the alternate font of `\CJKfamilydefault`.

3.2.1 X_YTEX font name search

Since the `fontspec` macro package documentation lacks instructions on how to view the available font names for X_YTEX, here is a brief explanation. X_YTEX usually uses the `fontconfig` library to find and call fonts, so the `fc-list` command can be used to display the available fonts

The following commands are used in the command line. Run the following command from the command line ("Command Prompt" for Windows, Console for Linux).


```
fc-list > fontlist.txt
```

You can store a list of all installed fonts on your system in the **fontlist.txt** file (which can be very long)

The **fc-list** command lists a lot of information and the output on a Windows system with a large number of fonts installed will be very large. e.g. it may

```
Times New Roman:style=cursiva,kurzíva,kursiv,Πλάγια,Italic,
  Kursivoitu,Italique,Dólt,Corsivo,Cursief,kursywa,Ítálico,Курсив, Ítalik,Po
  ševno,nghiêng,Etzana
Times New Roman:style=Negreta cursiva,tučné kurzíva,fed kursiv, Fett
  Kursiv,Έντονα Πλάγια,Bold Italic,Negrita Cursiva,
  Lihavoitu Kursivoi, Gras Italique, Félkövéř dólt, Grassetto Corsivo,
  Vet Cursief, Halvfet Kursiv, Pogrubiona kursywa, Negrito Ítálico,
  Полу́жирный К урсив,Ту́čná kurzíva,Fet Kursiv,Kalín Ítalik,
  Кре́пко рошевно,nghiêng đạm,Lodi etzana
Times New Roman:style=Negreta,tučné,fed,Fett,Έντονα,Bold,Negrita,
  Lihavoitu,Gras,Félkövéř,Grassetto,Vet,Halvfet, Pogrubiona,Negrito,
  Полу́жирный,Fet,Kalín,Кре́пко,đạm,Lodia
Times New Roman:style=Normal,obyčejné,Standard,Κανονικά,Regular,
  Normaali,Normál,Normale,Standaard,Normalny,Обы́чный,Normálne,Navadno,
  thường,Arrunta
Song,SimSun:style=Regular
bold,SimHei:style=Normal,obyčejné,Standard,Κανονικά,Regular,Normaali,
  Normál,Normale,Standaard,Normalny,Обы́чный,Normálne,Navadno, Arrunta
```

contain

The font family name used in **fontspec** or **xeCJK** is the part before the colon in the above list. For example, you can use

Exampl e 13
<pre>\setmainfont{Times New Roman} \setCJKmainfont{SimSun} % or \setCJKmainfont{宋体}</pre>

to set the font.

For convenience, **fc-list** command can also add various options to control the output format, for example, if you want to list all Chinese fonts' font family names,

```
fc-list -f "%{family}\n" :lang=zh > zhfont.txt
```

you can use the command.

This saves the list of fonts in the file **zhfont.txt**³. This makes the list of fonts more concise and easy to use, e.g.

Chinese fonts pre-installed under Windows.

```
Arial Unicode MS
FangSong,仿宋
KaiTi,普通体
Microsoft YaHei,微软雅
黑 MingLiU,細明體
NSimSun,新宋体
PMingLiU,新細明體
SimHei,黑体
SimSun,宋体
```

To list Japanese and Korean fonts, change the **zh** in the **:lang=zh** option to **ja** or **ko**.

fontspec and **xeCJK** can also access fonts using their filenames. For example, Song for Windows can also be accessed using the command

```
\setCJKmainfont{simsun.ttc}
```

to set it. The options and syntax for setting the font file name are described in the `fontspec macro package` manual, so I will not repeat them here. If there are some Chinese fonts with irregular font names `keCJK macro package` may not be able to access correctly by the font name, then you can also use this way to set them.

³Due to the Chinese character encoding, there is always a need to prevent garbling in the output file of the font list under Windows.

3.3 CJK partition font setting

As we all know, the number of CJK characters is extremely large, and a single font cannot cover all CJK characters. `xeCJK` can automatically use different fonts to output the text in different blocks within the CJK character range under the same CJK font family. First of all, you have to declare CJK sub-partitions.

```
\xeCJKDeclareSubCJKBlock * \xeCJKDeclareSubCJKBlock {⟨block⟩} {⟨block range⟩}
  \xeCJKDeclareSubCJKBlock * {⟨block⟩} {⟨block range⟩}
```

where $\langle block\ range \rangle$ is a list of commas, which can be the Unicode range of CJK characters, or a single character Unicode. e. g.

Exapl e 14
<pre>{ `Chinese -> `Wen , "3400 ->"4DBF , "5000 ->"7000 , `Han , `character , "3500 }</pre>

form. Note that the $\langle block\ range \rangle$ is set here unless it is really needed (e. g. some special fonts use

in the case of private use areas in Unicode) otherwise do not go beyond the CJK text

Exapl e 15
<pre>\xeCJKDeclareSubCJKBlock{SPUA}{ "E400 -> "E4DA , "E500 -> "E5E8 , "E600 -> "E6CE } \xeCJKDeclareSubCJKBlock{Ext-B}{ "20000 -> "2A6DF }</pre>

range preset in the source code. Use

The two sub-partitions SPUA and Ext-B are declared. Meanwhile, in the $\langle font\ features \rangle$ of the CJK font setting command introduced in Section 3.2, two new options, SPUA and Ext-B, are created. The usage of these two new options is similar to FallBack introduced in 3.2. You can use them to set fonts.

For example, you can use

Exapl e 16
<pre>\setCJKmainfont[SPUA=SunmanPUA,Ext-B=SimSun-ExtB]{SimSun}</pre>

Set the main font of the document to SimSun, the font of the SPUA partition to SunmanPUA, and the font of the Ext-B partition to SimSun-ExtB.

`\xeCJKDeclareSubCJKBlock` should be used before declaring all CJK font families. If there is a CJK font family without $\langle block \rangle$ option set, the $\langle block \rangle$ option of `\CJKfamilydefault` will be used as the $\langle block \rangle$ option of that CJK font family. $\langle block \rangle$ option for that CJK font family. If you want to use a certain CJK font family without switching fonts between CJK main partition and $\langle block \rangle$, you can use the $\langle block \rangle = *$ option. The command with an asterisk resets the character class to which the punctuation marks belong in addition to setting the CJK sub-partition.

```
\xeJKCancelSubCJKBlock \xeJKCancelSubCJKBlock {⟨block1 , block2 , ...⟩}
  \xeJKCancelSubCJKBlock {⟨block1 , block2 , ...⟩}
```

Undeclares the CJK partition in the document. The command with an asterisk also resets the character class to which the punctuation mark belongs.

```
\xeJKRestoreSubCJKBlock \xeJKRestoreSubCJKBlock {⟨block1 , block2 , ...⟩}
  \xeJKRestoreSubCJKBlock * {⟨block1 , block2 , ...⟩}
```

Restores the declaration of CJK partitions in the document. The command with an asterisk also resets the character class to which the punctuation mark belongs.

3.4 Set **CJK** character range

`\xeCJKDeclareCharClass *` `\xeCJKDeclareCharClass {⟨class⟩} {⟨class range⟩}`

`\xeCJKDeclareCharClass *` `{⟨class⟩} {⟨class range⟩}`

The format of `⟨class range⟩` is the same as `⟨block range⟩` in Section 3.3. The valid values of class are shown in the source code (Section 5.4). The valid values of `⟨class⟩` are shown in the source code (Section 5.4). `\xeCJK` already supports all **CJK** characters and punctuation in **Unicode**. In general, do not change character classes easily. Commands with asterisks reset the character class to which the punctuation symbol belongs in addition to setting the character class to ensure correct punctuation handling.

`\xeCJKResetCharClass *` Used to restore the initialization settings of `\xeCJK` for each character class.

`\xeCJKResetPunctClass` * Used to reset the character class to which the punctuation belongs.

`\normalspacedchars` `\normalspacedchars` *{(char list)}*

Spaces are not automatically added to the ends of characters appearing in the *(char list)*; the initial settings are `/,\,ad-` (U+002D).

3.5 Punctuation handling

The adjustment of `xecjk`'s output width of punctuation marks is achieved by adjusting the blank width on its left or right side. According to the current handling, for punctuation marks located on the left (such as left quotation marks) `xecjk` can only adjust the margin on its left; for punctuation marks located on the right (such as right quotation marks) `xecjk` can only adjust the margin on its right; for centered punctuation marks, it will adjust the margin on its left and right to ensure its centering. For the relevant settings of punctuation marks, they can only be made in the introduction area.

3.5.1 Set the width and spacing of specific punctuation marks

The settings here can be used for all punctuation processing formats **except plain**.

`\xeCJKsetwidth` * `\xeCJKsetwidth` *{(punctuation list) {(length)}*
`\xeCJKsetwidth` * *{(punctuation list) {(length)}*

Updated: 2013-08-22

The *punctuation list*) can be a single punctuation or multiple punctuation. For example

Exampl

```
\xeCJKsetwidth{. ?} {0.7em}
```

will set the width occupied by periods and question marks to **0.7em**. The command with an asterisk sets the width of punctuation marks when they appear at the beginning/end of a line.

`\xeCJKsetkern` * `\xeCJKsetkern` *{(pre-punctuation) {(post-punctuation) {(length)}*

`xecjk` will automatically adjust the blank width of the two adjacent preceding and following **CJK punctuation** marks according to the selected punctuation processing

Exampl

```
\xeCJKsetkern{:}{"}{0.3em}
```

format. If special adjustment is needed for individual cases, you can use this command. For example

will set the width of the space between the colon and the left double quote to **0.3em**.

3.5.2 Define punctuation handling format

`\xeCJKDeclarePunctStyle` * `\xeCJKDeclarePunctStyle` *{(style) {(options)}*

Updated: 2013-08-22 Define a new format for handling punctuation marks, the already existing format with the same name will be overwritten. The options that can be set are described below.

`\xeCJKEditPunctStyle` * `\xeCJKEditPunctStyle` *{(style) {(options)}*

Updated: 2013-08-22 Modify the existing punctuation handling format.

Below are the punctuation formatting options that can be set. The left column contains the name of the option, the center contains the type of input value for the option, and the right contains the associated description. Some options are mutually exclusive and have a priority relationship with each other. To make the next level of options valid, you need to disable the settings of the previous level first: set them to **false for options** of type `<boolean>`, to `\maxdimen` for options of type `<length>` and for options of type `<real>`, set it to `nan`.

`enabled-global-setting` `<boolean>` Whether to use `\xeCJKsetup`'s `PunctWidthPunctBoundWidth` options and `\xeCJKsetwidth`, `<boolean>`

The setting of `\xeCJKsetkern`. The default value is `true`.

`fixed-punct-width` `<length>` Sets the width of a single punctuation mark. The default value is `\maxdimen`.

fixed-punct-ratio *<real>* Sets the ratio of the output width of a single punctuation mark to its actual width. The default value is **1.0**.

mixed-punct-width *<length>* Set the width of the end-of-sentence punctuation, where the end-of-sentence punctuation is set by `\xeCJKsetup`'s `KaiMingPunct`

to set. The default value is the same as the value of the **fixed-punct-width** option.

mixed-punct-ratio *<real>* Sets the width ratio of the end-of-sentence punctuation. The default value is the same as the value of the **fixed-punct-ratio** option.

middle-punct-width *<length>* Set the width of the center punctuation, where the center punctuation is set by the `MiddlePunct` of `\xeCJKsetup`

to set. The default value is the same as the value of the **fixed-punct-width** option.

middle-punct-ratio *<real>* Sets the width ratio of the centered punctuation marks. The default value is the same as the value of the **fixed-punct-ratio** option.

The above options set the fixed width or proportion of punctuation, and `\xeCJK` will calculate the blank width of the **left/right** of punctuation marks according to the set options. The following options set the blank width or proportion of the **left/right** of the punctuation marks, so the width of different punctuation marks may be different. In order for the following options to take effect, the corresponding options above need to be disabled first. Priority is from top to bottom.

fixed-margin-width *<length>* Set the left/right margin width of the **marker**. The default value is `\maxdimen`.

fixed-margin-ratio *<real>* Sets the ratio of the left/right margin width of a punctuation point to the corresponding actual border width of that punctuation point in the font. The default value is **1.0**.

mixed-margin-width *<length>* Sets the left/right margin width of the end-of-sentence punctuation. The default value is the same as the value of **fixed-margin-width**. **mixed-margin-ratio**

<real> Set the ratio of the left/right margin width of the end-of-sentence punctuation. The default value is the same as the value of **fixed-margin-ratio**.

Same.

middle-margin-width *<length>* Sets the width of the margin on both sides of the centered marker. The default value is the same as the value of **fixed-margin-width**. **middle-margin-ratio** *<real>* Sets the ratio of the sum of the margin width on both sides of the centered marker to the sum of the actual two border widths on both sides. The default value is

The same value as **fixed-margin-ratio**.

The following options set the width or scale of punctuation marks when they appear at the beginning or end of a line.

bound-punct-width *<length>* Sets the width of the **punctuation** mark when it appears at the beginning/end of a line. The default value is `\maxdimen`.

bound-punct-ratio *<real>* Sets the ratio of the output width to the actual width when the punctuation appears at the **beginning/end of the line**. The default value is `nan`. **bound-**

margin-width *<length>* Sets the left/right margin width when the punctuation appears at the **beginning/end of the line**. The default value is `\maxdimen`.

bound-margin-ratio *<real>* Sets the ratio of the left/right margin width to the corresponding actual border width when the punctuation mark appears at the beginning/end of the line. The default value is **0**.

enabled-hanging *<boolean>* Whether to allow the punctuation marks to hang out of the page border when the result of the above option is less than the actual border width of the punctuation marks. The default value is **false**.

add-min-boundary-to-margin *<boolean>* Whether to add the minimum value in the actual left and right boundary width of the **marker** to the result of the above calculation. This selection

item is not valid for centered punctuation. The default value is **false**.

optimize-margin *(boolean)* When using the above option to set the margin width or scale, the final output may have a margin width to the left/right of the punctuation mark that is greater than the original actual border width. If this option is set to **true** at this time, the actual border width is used. If the **fixed-punct-width** option is enabled, the **left/right** margin width calculated with the **fixed-punct-width** option may be less than the width of the other side of the punctuation mark. The default value is **false**.

margin-minimum *(length)* Specifies the minimum margin width to the left/right of the punctuation mark. When the margin width set by the above option is smaller than the value of this option, the value of this option is used. The default value is **0pt**.

The following options handle the width of the space between two adjacent punctuation marks before and after. These options are mutually exclusive, with top-down priority.

enabled-kerning *(boolean)* Whether to adjust the margin width between two adjacent punctuation points before and after. If set to **false**, each punctuation point is output at its original output width. The default value is **true**.

min-bound-to-kerning *(boolean)* Whether to use the maximum of the minimum of the actual left and right boundaries of the preceding punctuation in the current font and the minimum of the actual left and right boundaries of the following punctuation as the margin width between the two punctuations. The default value is **false**.

kerning-total-width *(length)* Set the total width of the two punctuation points. In this case, **xeCJK** will automatically calculate the blank width between the two punctuation points. The default value is **\maxdimen**.

kerning-total-ratio *(real)* Sets the ratio of the total output width of the two punctuation points to the actual width. The default value is **0.75**. **same-align-margin** *(length)* The width of the margin between the two preceding and following punctuation points when they are on the same side. The default value is **\maxdimen**.

same-align-ratio *(real)* The ratio of the margin width between the two preceding and following punctuation points when they are on the same side to the actual output width. The default value is `nan`.

different-align-margin *(length)* The width of the margin between the front **a n d b a c k** two punctuation points when they are on opposite sides. The default value is `\maxdimen`. **different-align-ratio** *(real)* The ratio of the margin width to the actual output width between the two markers when they are on opposite sides. Default value It's `nan`.

kerning-margin-width *(length)* Sets the width of the margin between the front and back two markers. The default value is `\maxdimen`.

kerning-margin-ratio *(real)* Set the ratio of the margin width between the front and back two markers to the actual output margin. The default value is `1.0`.

optimize-kerning *(boolean)* The margin width between two punctuation marks calculated using the above option may be less than the result obtained with the **min-bound-to-kerning** option. When this happens, if this option is set to **true**, the **whitespace** width of this option is used. The default value is **false**.

kerning-margin-minimum *(length)* Specifies the minimum margin width between two punctuation marks. When the margin width set by the above option is smaller than the value of this option, the value of this option is used. The default value is `0pt`.

In fact, the default setting of **xeCJK** is equivalent to the Chinese full-angle (**quanjiao**) format. You can use the options described above to define a new

Exapl

```
\xeCJKDeclarePunctStyle { mine }
{
  fixed-punct-ratio      = nan ,
  fixed-margin-width    = 0 pt ,
  mixed-margin-width    = \maxdimen ,
  mixed-margin-ratio    = 0.5 ,
  middle-margin-width   = \maxdimen ,
  middle-margin-ratio   = 0.5 ,
  add-min-bound-to-margin = true ,
  bound-punct-width     = 0 em ,
  enabled-hanging       = true ,
  min-bound-to-kerning  = true ,
  kerning-margin-minimum = 0.1 em
}
```

punctuation processing format. For example, use

A punctuation format called **mine** is defined. This can be done in the introductory section via the

```
\xeCJKsetup{PunctStyle=mine}
```

Use this format in documents. It is meant to: use the smallest of the actual left/right borders of a punctuation mark as its left/right margin width, plus half of the actual margin for end-of-line punctuation and centered punctuation; have zero width when the punctuation appears at the beginning or end of a line, allowing hanging out of the page boundary; use the smaller of the actual borders of two adjacent punctuation marks as the margin width between them, and the minimum margin width is Again, for example, using

Exapl

e 20

```
\xeCJKEditPunctStyle { hangmobanjiang } { enabled-global-setting = false }
```

will make the settings of `\xeCJKsetkern` etc. invalid for the format **hangmobanjiang**.

3.6 **xeCJKfntef** Usage Notes

xeCJK contains a sub-macro package **xeCJKfntef** which can be used to implement **HbAa** and line breakable underscore, etc. It is the replacement version of **CJKfntef** macro package under **XELATEX**, and the basic usage is exactly the same.

xeCJKfntef is based on the **ulem** macro package, and in addition to being compatible with some of the commands defined by **ulem**, it also has some extensions.

<code>\CJKunderline</code>	<code>\CJKunderline [*] [-] [(Options)] {(Content)}</code>
<code>\CJKunderdblline</code>	
<code>\CJKunderwave</code>	The white of the virtual room is bornauspicious stop
<code>\CJKsout</code>	<code>\CJKunderline{Void Room, White, Auspicious Stop}\</code>
<code>\CJKxout</code>	<code>\CJKunderdblline{Virtual Room to produce white, auspicious stop}\</code>
Updated: 2014-11-04	<code>\CJKunderwave{Void Room, White, Auspicious Stop}\</code>
	<code>\CJKsout{Virtual room is white, auspicious stop}\</code>
	虚//寿//生//白//,吉//祥//止//止//
1	<code>\CJKunderline- {Southern Dynasty} \CJKunderline- {Liang} \CJKunderline- {Liu Fu}%</code>
2	<code>\CJKunderwave- {Wenxin Diao Long} \CJKunderwave- {Nurturing Qi}\</code>
3	<code>\CJKunderline*[thickness=1pt,hidden=true] {Looking at his section, the empty room is white,</code>

Southern Liang Dynasty Liu Xin Diao Long

`\CJKunderdot` `\CJKunderdot [(Options)] {(Content)}`

Updated: 2014-11-04 Adding dots under Chinese characters can be used in nesting with the underline command above. For example

White in the virtual roomauspicious stop	<code>\CJKunderline{Virtual Room for</code>
虚//寿//生//白//,吉//祥//止//止//	<code>White, \CJKunderdot{Occidental}Stop}\</code>
	2

For the above six types of objects, `\xeCJKfntef` provides some options to set the position and color of the points or lines. You can use

`\xeCJKsetup` Set them uniformly in advance, or you can set them specially when you use them.

`skip`

```
\xeCJKsetup { underline/skip = <true|false> }
\xeCJKsetup { underline = { skip = <true|false> , ... } }
```

New: 2014-11-04

By default, underscore will automatically skip Chinese punctuation, you can set this option to **false** disable this feature. The * sign after the corresponding underscore command has the same effect.

`Subtract is` set to **true** to reduce the distance between the first and last underscores, avoiding the underline before and after the underscore, which is applicable to the proper name and book name in the punctuation of ancient books. Add the - sign after the corresponding underline command to have the same effect.

set this option to **true** to hide the text content and draw only underlines.

```
\xeCJKsetup { underline/format = \color{red} }
\xeCJKsetup { underwave = { format = \color{red}, ... } }
```

Set the format of the line or point, such as the color.

`textformat` Sets the formatting of the body of the underline or dot. For example.

New: 2016-06-031	<code>\CJKunderline[textformat=\color{blue}]{Void room is white, auspicious stop}\</code>
2	<code>\CJKunderdot[textformat=\bfseries,format=\color{red}]{Virtual room to produce white,</code>

The white of the virtual room is bornauspicious stop

虚//寿//生//白//,吉//祥//止//止//

`symbol` Set the `symbol` of `\CJKunderwave` or `\CJKunderdot`.

For example, the wavy line `\CJKunderwave`'s symbol does not change with the font size and does not look good in small font size. We can change it to change size with font size as follows.

```
1 % \usepackage{fix-cm}
2 \xeCJKsetup{
3   underwave/symbol=
   \fontsize{0.5em}{0pt}%
   \fontencoding{U}\fontfamily{lasu}\selectfont
```

The one who looks at the section of the song⁴ white room is born, suspicious stop

5
6
7
8

`\underline` sets the thickness of the lines of `\CJKUnderline`, `\CJKUnderdblline` and `\CJKsout`. The initial value is `\ULthickness`.

`\depth` sets the depth of the line or point (the distance from the baseline to the top of the line or point) The initial value is `0.2em`.

`\boxdepth` `\CJKUnderdot` may affect the line spacing, you can set this option to adjust it. If you don't want `\CJKUnderdot` to affect the line spacing, you can set this option to `Opt`.

`\sep` set the distance between `\CJKUnderdot` and `\CJKUnderline`, `\CJKUnderdblline` or `\CJKUnderwave` when they are used in nesting, the distance between point and line or line and point.

`\gap` Set the distance between the two lines of `\CJKUnderdblline`. The initial value is `1.1pt`.

`\height` sets the height of the strikethrough `\CJKsout` (the distance from the center of the line to the baseline) The initial value is `0.35em`. For example, we can set the thickness and color of `\CJKsout` so that it has a highlighting-like effect: `\CJKsout` has the following effect

```
1 \CJKsout*[thickness=2.5ex,format=\color{yellow}]{Looking at his section, the empty room is
```

The one who looks at the

`\xeCJKfntef` also provides `\CJKUnderanyline` and `\CJKUnderanysymbol` for customizing underscore and symbol.

`\CJKUnderanyline` `\CJKUnderanyline` [*] [-] [Options] {Depth} {Underline content} {Text content}

Updated: 2014-11-07 `\xeCJKfntef` First put the down content into a box (`\xeCJKfntefbox`) then move (depth) down a given distance, and then use it for padding. The available (options) are `textformat`, `skiphiddensubtractsep`, and `boxdepth`. the initial values of options `sep` and `boxdepth` are empty, which means the function of the option is disabled. They can be set by the object `ulem` in `\xeCJKsetup`.

For example, the highlighting effect can also be implemented as follows.

```
1 \CJKUnderanyline*{0.5ex}{\color{yellow}\rule{2pt}{2.5ex}}{virtual room to produce white,
```

The white of the

`\CJKUnderanysymbol` `\CJKUnderanysymbol` [(option)] {depth} {(symbol)} {Text content}

Updated: 2014-11-04 `\xeCJKfntef` puts the (symbol) into a box (`\xeCJKfntefbox`). The (Depth) parameter is used to set the depth of the top of the box (the distance from the baseline to the top of the box) The available (options) are `textformat`, `sep` and `boxdepth`, with the same meaning as `\CJKUnderdot`'s the same.

For example, adding triangles to Chinese characters can be set as follows.

```
1 \CJKUnderanysymbol[sep=0.1em]{0.2em}{\tiny$\triangle$}
2 {CJKUnderline{Occidental Stop}}
```

The one who looks at the section of the song, the white room is born, and the auspicious stop
 ▲▲▲▲▲ ▲▲▲▲▲ ▲▲▲▲▲

`\xeCJKfntefon` `\xeCJKfntefon` [*] [-] [(Options)]

Updated: 2014-11-07 Function and Usage The `\ULon` of the `ulem` macro package is the same, extending

the optional parameter symbols * and -, and the available options are `textformat`, `skip`, `hidden` and `subtract`. These four options are also valid for commands such as `\uline`, which need to be set in `\xeCJKsetup` by the object `ulem`. For example

```
1 \xeCJKsetup{ulem={textformat=\bfseries\color{red}, skip=true}}
2 \uline {virtual room to produce white, auspicious stop}
```

The white of the virtual room is born, auspicious stop

In addition, `\xeCJKfntef` also provides an environment to specify the width to allow Chinese characters to be scattered and aligned `CJKfilltwosides` and `CJKfilltwosides*`.

`\CJKfilltwosides` `\begin{CJKfilltwosides} [⟨position⟩] {⟨width⟩}`
`\end{CJKfilltwosides}`
 Updated: 2014-11-04

Text Content

`\end{CJKfilltwosides}`

The contents of the environment are placed in the vertical box. The optional parameter `⟨Position⟩` specifies the baseline position of the box. You can use `t` (top) `c` (center) and `b` (bottom), and the default is `c`. The `⟨width⟩` parameter specifies the width of the box. The difference between the `CJKfilltwosides*` environment and `CJKfilltwosides` is that when the width is not greater than zero or not greater than the natural width of the box, the natural width of the box is taken. For example

<pre>view he The one who The room of emptiness is white, auspicious stop</pre>	<pre>1 \begin{CJKfilltwosides}{.8\linewidth} 2 The one who looks at his section, \\ 3 The white of the virtual room is born, 4 auspicious stop</pre>
<pre>view he the section of the White in the virtual roomauspicious stop</pre>	<pre>1 \begin{CJKfilltwosides*}{Opt} 2 The one who looks at his section, \\ 3 The white of the virtual room is born, 4 auspicious stop</pre>

3.7 Other

`\xeCJKVerbAddon` Adjust the text spacing so that the width occupied by CJK characters is equal to the width of two spaces in a Spanish equivalent font. If the two

`\xeCJKOffVerbAddon` The width of the space is smaller than the width of the current CJK normal text, and the CJK font will be reduced appropriately. This is good for cases such as code alignment of

equal-width font Updated: 2012-11-16. It should be noted that `\xeCJKVerbAddon` has made a big change to the internal of `xeCJK`, after using it, automatic line feeds between CJK character classes will be disabled, which is consistent with the situation in Western language in transcription environment.

s. So it should not be used alone, it should be put in a group to limit its scope, otherwise it is invalid. Of course it can be used in conjunction with other macro packages about code transcription. For example, it can be used with the `formatcom` option of the `fancyvrb` macro package. The font set in this case should indeed be of equal width to ensure alignment. If there is a change in the font width (including the font size), the `\xeCJKVerbAddon` needs to be used after it to recalculate the spacing width. `\xeCJKOffVerbAddon` is used to cancel it partially in the environment where `\xeCJKVerbAddon` is used. Since the `listings` macro package has its own code alignment mechanism, `\xeCJKVerbAddon` is not valid in the code environment defined by `listings`.

`\xeCJKnobreak`..... Chinese characters. `\xeCJKnobreak\footnote{footnote}`

New: 2012-12-03 `\xeCJKnobreak` is used after full punctuation to ensure that lines cannot be broken here. If the `CheckFullRight` option described earlier is enabled, this command is no longer needed.

`\xeCJKShipoutHook` `xeCJK` has some special settings in the text (dotting under Chinese characters, splitting in `verbatim` or `lstlisting` environment).

(New: 2013-11-09 page) may affect the contents of TEX's output routine (e. g., headers and footers) `\xeCJKShipoutHook` is used to restore the normal settings in the text. `xeCJK` has already handled the case of header and footer, and the others need to be called according to the situation. For example, if you use `eso-pic` or `atbegshi` to implement text watermarking, and if you use the special form listed above in the text, you need to use the following command at the top of the `\AtBeginShipout`

parameter
`\xeCJKShipoutHook`.

Section 4 Known Issues and Compatibility

According to the `unicode-data` macro package, X_YTEX sets the `\catcode` of all CJK ideographs to 11. Therefore, Chinese characters can be used as the names of control sequences directly, but when they appear after the control sequence, they should be separated by a space, otherwise it will show “! Undefined control sequence.” error will appear.

`xeCJK` uses and redefines some macro commands of `CJK` macro package, such as `\CJKfamily`, `\CJKsymbol` and `\CJKglue`, etc. It should be noted that `xeCJK` does not need `CJK` support, and `xeCJK` automatically disables loading `CJK macro packages` after it. You can load the `CJKnumb macro package` after `xeCJK` to realize the Chinese language of numbers, or you can use the more functional `zhnumber` macro package.

xeCJK has done some processing so that the *listings* macro package can support Unicode when using X_YTEX.

listings defines a code environment in which Chinese can be used directly, and no longer requires *escapechar*.

The new version (3.x) of *xeCJK* is completely written with L^AT_EX₃ syntax. L^AT_EX₃ has abandoned the concept of *\outer macros*, so the related tools may have problems when encountering *\outer macros*. According to the current implementation of *xeCJK*, when *\outer macros* are encountered after the CJK text, something like

! Forbidden control sequence found while scanning use of \use_i:nn

The error is a known one. Currently known is *\cprotect* provided by the *cprotect* macro package, which is defined as

```
\outer\long\def\cprotect{\icprotect}
```

In fact, when *cprotect* is introduced *xeCJK* will use

```
\let\cprotect\icprotect
```

to remove the external macro restriction of *\cprotect*. However, due to the special nature of *\cprotect*, it should only be used externally, i.e. do not let it appear in the arguments of any macros. In the case of other *\outer macros*, you can add *\relax* in front of it to get around the above error.

xeCJK relies on the *\XeTeXinterchartoks* mechanism of X_YTEX, and there may be conflicts of varying sizes with macro packages that use the same mechanism, such as *poly-glossia* and *xesearch*. *xeCJK* has some handling for this, but care should be taken when using it together with them.

Section 5 *xeCJK* Code Implementation

1 *<package>*

2 *<@@=xeCJK>*

5.1 Operating environment check

xeCJK must use the support of X_YTEX engine.

```
3 \msg_new:nnn { xeCJK } { Require-XeTeX }
4 {
5   The~xeCJK~package~requires~XeTeX~to~function.\\
6   You~must~change~your~typesetting~engine~to~"xelatex"\\
7   instead~of~plain~"latex"~or~"pdflatex"~or~"lalatex".\\
8   Loading~xeCJK~will~abort!
9 }
10 \sys_if_engine_xetex:F { \msg_critical:nn { xeCJK } { Require-XeTeX } }
```

A newer version of the *expl3* macro package should be used.

```
11 \msg_new:nnn { xeCJK } { l3-too-old }
12 {
13   Support~package~`#1'~too~old. \\
14   Please~update~an~up~to~date~version~of~the~bundles\\
15   `l3kernel'~and~`l3packages'\\
16   using~your~TeX~package~manager~or~from~CTAN.\\
17   \str_if_eq:nnT {#1} { expl3 } { Loading~xeCJK~will~abort!}
18 }
19 \@ifpackagelater { expl3 } { 2020/02/08 } {}
20 { \msg_critical:nnn { xeCJK } { l3-too-old } { expl3 } }
```

\ctex_disable_package:n is provided by *ctexhook*.

`\xeCJK_if_package_loaded:n` Determine if macro package has been introduced or not, can be used in the body of the document.

```

22 \prg_new_conditional:Npnn \xeCJK_if_package_loaded:n #1 { p , T , F , TF }
23 {
24   \tl_if_exist:cTF { ver@ #1 . \c xeCJK_package_ext_tl }
25     { \prg_return_true: } { \prg_return_false: }
26 }
27 \tl_const:Nx \c xeCJK_package_ext_tl { \@pkgextension }

```

The following CJK series macro packages should not be used.

```

28 \msg_new:nnn { xeCJK } { after-package }
29 {
30   The~`#1'~package~and~xeCJK~are~incompatible.\\\
31   Please~load~it~after~xeCJK.
32 }
33 \clist_map_inline:nn { CJKnumb }
34 {
35   \xeCJK_if_package_loaded:nT {#1}
36     { \msg_error:nnn { xeCJK } { after-package } {#1} }
37 }
38 \clist_map_inline:nn
39   { CJKulem , CJKvert , CJKpunct , CJKutf8 , CJK }
40   { \ctex_disable_package:n {#1} }

```

Replace the `CJKfntef` package with the `xeCJKfntef` package.

```

41 \ctex_if_format_at_least:nTF { 2020/10/01 }
42   { \ctex_replace_package:nn { CJKfntef } { xeCJKfntef }
43     { \ctex_disable_package:n { CJKfntef } }

44 \cs_if_exist:NF \NewDocumentCommand
45   { \RequirePackage { xparse } }
46 \RequirePackage { xtemplate }

```

5.2 Internal Tools

Assign temporary variables.

```

47 \tl_new:N \l xeCJK_tmp_tl
48 \int_new:N \l xeCJK_tmp_int
49 \box_new:N \l xeCJK_tmp_box
50 \dim_new:N \l xeCJK_tmp_dim
51 \bool_new:N \l xeCJK_tmp_bool
52 \skip_new:N \l xeCJK_tmp_skip
53 \clist_new:N \l xeCJK_tmp_clist

```

`\xeCJK_msg_new:nn` Abbreviated form of various message functions.

```

\xeCJK_error:n
\ xeCJK_error:nx
\ xeCJK_warning:nx
\ xeCJK_info:nxx
54 \cs_new_protected:Npn \xeCJK_msg_new:nn { \msg_new:nn { xeCJK } }
55 \cs_new_protected:Npn \xeCJK_msg_new:nnn { \msg_new:nnn { xeCJK } }
56 \cs_new_protected:Npn \xeCJK_error:n { \msg_error:nn { xeCJK } }
57 \cs_new_protected:Npn \xeCJK_error:nx { \msg_error:nxx { xeCJK } }
58 \cs_new_protected:Npn \xeCJK_warning:n { \msg_warning:nn { xeCJK } }
59 \cs_new_protected:Npn \xeCJK_warning:nx { \msg_warning:nxx { xeCJK } }
60 \cs_new_protected:Npn \xeCJK_warning:nxx { \msg_warning:nnxx { xeCJK } }
61 \cs_new_protected:Npn \xeCJK_warning:nxxx { \msg_warning:nnxxx { xeCJK } }
62 \cs_new_protected:Npn \xeCJK_info:nxx { \msg_info:nnxx { xeCJK } }

\xeCJK_allow_break:
\ xeCJK_no_break:
63 \cs_new_protected:Npn \xeCJK_allow_break:
64   { \tex_penalty:D \c_zero_int }
65 \cs_new_protected:Npn \xeCJK_no_break:
66   { \tex_penalty:D \c xeCJK_nobreak_penalty_int }
67 \int_const:Nn \c xeCJK_nobreak_penalty_int { 10 000 }

```

```

\xeCJK_at_end_preamble:n Add various hooks before and after \document and after macro package, depending on ctexhook.
\xeCJK_after_preamble:n
68 \AtBeginDocument          { \xeCJK@document@hook }
\xeCJKK_after_end_preamble:n
69 \ctex_at_end_preamble:    n{ \xeCJK@document@left@hook }
  \xeCJK_package_hook:nn
70 \ctex_after_end_preamble:n { \xeCJK@document@right@hook }
71 \cs_new_protected:Npn \xeCJK@document@hook
72   { \tl_use:N \g xeCJK_after_preamble_hook_tl }
73 \cs_new_protected:Npn \xeCJK@document@left@hook
74   { \tl_use:N \g xeCJK_at_end_preamble_hook_tl }
75 \cs_new_protected:Npn \xeCJK@document@right@hook
76   { \tl_use:N \g xeCJK_after_end_preamble_hook_tl }
77 \cs_new_protected:Npn \xeCJK_at_end_preamble:n
78   { \tl_gput_right:Nn \g xeCJK_at_end_preamble_hook_tl }
79 \cs_new_protected:Npn \xeCJK_after_preamble:n
80   { \tl_gput_right:Nn \g xeCJK_after_preamble_hook_tl }
81 \cs_new_protected:Npn \xeCJK_after_end_preamble:n
82   { \tl_gput_right:Nn \g xeCJK_after_end_preamble_hook_tl }
83 \cs_new_protected:Npn \xeCJK_package_hook:nn
84   { \ctex_at_end_package:nn }
85 \tl_new:N \g xeCJK_at_end_preamble_hook_tl
86 \tl_new:N \g xeCJK_after_preamble_hook_tl
87 \tl_new:N \g xeCJK_after_end_preamble_hook_tl

```

\xeCJKShipoutHook adds hooks in the `\shipout` box to affect the header and footer. `\AtBeginDvi` saves the parameters in the box, and `atbegshi's \AtBeginShipout` works after the `\shipout` box is built, so neither of them can affect the header footer. We do this by adding hooks to `\@begindvi`. Note that after the first use of `\@begindvi`, it defines itself as `\@empty`.

```

88 \xeCJK_after_preamble:n
89   { \tl_put_right:Nn \@begindvi { \xeCJK@first@begindvi } }
90 \cs_new_protected:Npn \xeCJK@first@begindvi
91   {
92     \xeCJKShipoutHook
93     \cs_if_exist:NTF \@begindvi
94       { \tl_gput_right:Nn }
95       { \tl_const:Nn }
96     \@begindvi { \xeCJKShipoutHook }
97   }
98 \NewDocumentCommand \xeCJKShipoutHook {}
99   {
100    \bool_if:NF \l xeCJK_shipout_hook_bool
101    {
102      \bool_set_true:N \l xeCJK_shipout_hook_bool
103      \tl_use:N \l xeCJK_shipout_hook_tl
104    }
105  }

```

`\xeCJK_add_to_shipout:n` 往 `\shipout` box add hook.

```

106 \cs_new_protected:Npn \xeCJK_add_to_shipout:n
107   { \tl_put_right:Nn \l xeCJK_shipout_hook_tl }
108 \tl_new:N \l xeCJK_shipout_hook_tl
109 \bool_new:N \l xeCJK_shipout_hook_bool

```

`\xeCJK_tl_remove_outer_braces:n` Remove the #1 outer grouping braces.

```

110 \cs_new:Npn \xeCJK_tl_remove_outer_braces:n #1
111   {
112     \exp_last_unbraced:Ne
113     \xeCJK_tl_remove_outer_braces:w { \tl_trim_spaces:n {#1} } \s_stop
114   }
115 \cs_new:Npn \xeCJK_tl_remove_outer_braces:w #1 \s_stop
116   {
117     \tl_if_single:nTF {#1}
118     {
119       \tl_if_head_is_N_type:nTF {#1}
120       { \tl_trim_spaces:n }

```

```

121     { \xeCJK_tl_remove_outer_braces:n }
122   }
123   { \tl_trim_spaces:n }
124   { #1 }
125 }

```

`\xeCJK_cs_clear:N` Let the meaning of the control sequence be empty.
`\xeCJK_cs_gclear:N`

```

126 \cs_new_protected:Npn \xeCJK_cs_clear:N #1
127   { \cs_set_eq:NN #1 \prg_do_nothing: }
128 \cs_new_protected:Npn \xeCJK_cs_gclear:N #1
129   { \cs_gset_eq:NN #1 \prg_do_nothing: }

```

Meaning of `\xeCJK_swap_cs:NN` swap #1 and #2.

```

130 \cs_new_protected:Npn \xeCJK_swap_cs:NN #1#2
131   {
132     \cs_set_eq:NN \xeCJK_swap_cs_aux:w #1
133     \cs_set_eq:NN #1 #2
134     \cs_set_eq:NN #2 \xeCJK_swap_cs_aux:w
135     \cs_undefine:N \xeCJK_swap_cs_aux:w
136   }

```

`\xeCJK_font_gset_to_current:N #1` is the name of the control sequence, make it equal to the current font command.

```

137 \cs_new_protected:Npn \xeCJK_font_gset_to_current:N
138   { \exp_after:wN \xeCJK_font_gset_to_current_aux:NN \tex_the:D \tex_font:D }
139 \cs_new_protected:Npn \xeCJK_font_gset_to_current_aux:NN #1#2
140   { \cs_if_eq:NNF #1 \tex_nullfont:D { \cs_gset_eq:NN #2#1 } }

```

`\xeCJK_glyph_if_exist_p:N` Determines if the current font contains character #1. A similar function in `fontspec` will leave a

`\xeCJK_glyph_if_exist:NTF` `\scan_stop:` causes unnecessary bounds and is also not fully scalable. Therefore, we redefine it.

```

141 \prg_new_conditional:Npnn \xeCJK_glyph_if_exist:N #1 { p , T , F , TF }
142   {
143     \tex_iffontchar:D \tex_font:D `#1 \exp_stop_f:
144     \prg_return_true: \else: \prg_return_false: \fi:
145   }

```

`\c_xeCJK_space_skip_tl` The length of the glue generated by a space between words in the current font state, including the stretch and shrink parts.

```

146 \tl_const:Nn \c_xeCJK_space_skip_tl
147   {
148     \int_compare:nNnTF \g_xeCJK_space_factor_int = { 1000 }
149     {
150       \skip_if_eq:nnTF \tex_spaceskip:D \c_zero_skip
151       {
152         \tex_fontdimen:D 2 ~ \tex_font:D
153         plus \tex_fontdimen:D 3 ~ \tex_font:D
154         minus \tex_fontdimen:D 4 ~ \tex_font:D
155       }
156       { \tex_spaceskip:D }
157     }
158     {
159       \skip_if_eq:nnTF \tex_spaceskip:D \c_zero_skip
160       {
161         \int_compare:nNnTF \g_xeCJK_space_factor_int < { 2000 }
162         {
163           \xeCJK_space_skip_scale:nnn
164           { \tex_fontdimen:D 2 ~ \tex_font:D }
165         }
166         {
167           \skip_if_eq:nnTF \tex_xspaceskip:D \c_zero_skip
168           {
169             \xeCJK_space_skip_scale:nnn
170             {
171               \tex_fontdimen:D 2 ~ \tex_font:D +
172               \tex_fontdimen:D 7 ~ \tex_font:D
173             }

```

```

174         }
175         { \tex_xspaceskip:D \use_none:nn }
176     }
177     { \tex_fontdimen:D 3 ~ \tex_font:D }
178     { \tex_fontdimen:D 4 ~ \tex_font:D }
179 }
180 {
181     \int_compare:nNnTF \g_xeCJK_space_factor_int < { 2000 }
182     { \xeCJK_space_skip_scale:nnn { \tex_xspaceskip:D } }
183     {
184         \skip_if_eq:nnTF \tex_xspaceskip:D \c_zero_skip
185         {
186             \xeCJK_space_skip_scale:nnn
187             {
188                 \tex_xspaceskip:D +
189                 \tex_fontdimen:D 7 ~ \tex_font:D
190             }
191         }
192         { \tex_xspaceskip:D \use_none:nn }
193     }
194     { \tex_gluestretch:D \tex_xspaceskip:D }
195     { \tex_glueshrink:D \tex_xspaceskip:D }
196 }
197 }
198 }
199 \cs_new:Npn \xeCJK_space_skip_scale:nnn #1#2#3
200 {
201     \dim_eval:n {#1}
202     plus \fp_eval:n { \g_xeCJK_space_factor_int / 1000 } #2
203     minus
204     \int_div_truncate:nn
205     { 1000 * \int_value:w #3 } { \g_xeCJK_space_factor_int } sp
206 }

```

`\xeCJK_reset_space_factor:` In `\XeTeXinterchartoks`, `\spacefactor` has been reset to 1000. We need to keep the `\xeCJK_reset_space_factor` in the Default class.

`\g_xeCJK_space_factor_int` exist `\spacefactor` used to calculate the space width.

```

207 \int_new:N \g_xeCJK_space_factor_int
208 \cs_new_protected:Npn \xeCJK_reset_space_factor:
209 { \int_gset:Nn \g_xeCJK_space_factor_int { 1000 } }
210 \xeCJK_reset_space_factor:

```

`\xeCJK_glue_to_skip:nN` Get the length of a glue, including the stretch and shrink parts. If the parameter is not glue, then take its width.

```

211 \cs_new_protected:Npn \xeCJK_glue_to_skip:nN #1#2
212 {
213     \group_begin:
214     \hbox_set:Nw \l_xeCJK_tmp_box #1 \scan_stop:
215     \xeCJK_if_last_glue:TF
216     {
217         \exp_args:NNNo \hbox_set_end:
218         \skip_set:Nn #2 { \skip_use:N \tex_lastskip:D }
219     }
220     {
221         \exp_args:NNNo \hbox_set_end:
222         \skip_set:Nn #2 { \dim_use:N \box_wd:N \l_xeCJK_tmp_box }
223     }
224     \exp_args:NNNo \group_end:
225     \skip_set:Nn #2 { \skip_use:N #2 }
226 }

```

`\xeCJK_int_until_do:nn` can be a little bit faster than `\int_until_do:nNnn` because the definition is simpler.

```

\xeCJK_int_until_do:wn
227 \cs_new_protected:Npn \xeCJK_int_until_do:nn #1#2
228 {
229     \xeCJK_int_until_do:wn \use_none:n
230     { \reverse_if:N \if_int_compare:w #1#2 }
231 }

```

```

232 \cs_new_protected:Npn \xeCJK_int_until_do:wn \use_none:n #1
233   { #1 \exp_after:wN \xeCJK_int_until_do:wn \fi: \use_none:n {#1} }
234 \int_new:N \l_xeCJK_begin_int
235 \int_new:N \l_xeCJK_end_int

```

`\xeCJK_peek_catcode_ignore_spaces:N`TF We set a variable `\l_xeCJK_peek_ignore_spaces_bool` in it to identify whether the space after it is omitted or not.

```

236 \cs_new_protected:Npn \xeCJK_peek_catcode_ignore_spaces:NTF #1#2#3
237   {
238     \cs_set_eq:NN \l_xeCJK_peek_search_token #1 \scan_stop:
239     \cs_set_protected:Npx \xeCJK_peek_catcode_true:w
240       { \exp_not:N \group_align_safe_end: \exp_not:n {#2} }
241     \cs_set_protected:Npx \xeCJK_peek_catcode_false:w
242       { \exp_not:N \group_align_safe_end: \exp_not:n {#3} }
243     \bool_set_false:N \l_xeCJK_peek_ignore_spaces_bool
244     \group_align_safe_begin:
245     \peek_after:Nw \xeCJK_peek_catcode_ignore_spaces_branches:w
246   }
247 \cs_new_protected:Npn \xeCJK_peek_catcode_ignore_spaces_branches:w
248   {
249     \if_meaning:w \l_peek_token \c_space_token
250     \bool_set_true:N \l_xeCJK_peek_ignore_spaces_bool
251     \exp_after:wN \peek_after:Nw
252     \exp_after:wN \xeCJK_peek_catcode_ignore_spaces_branches:w
253     \tex_romannumeral:D 0
254   \else:
255     \if_catcode:w
256     \exp_not:N \l_peek_token \exp_not:N \l_xeCJK_peek_search_token
257     \exp_after:wN \exp_after:wN
258     \exp_after:wN \xeCJK_peek_catcode_true:w
259   \else:
260     \exp_after:wN \exp_after:wN
261     \exp_after:wN \xeCJK_peek_catcode_false:w
262   \fi:
263   \fi:
264 }
265 \cs_new_eq:NN \l_xeCJK_peek_search_token ?
266 \cs_new_eq:NN \xeCJK_peek_catcode_true:w \prg_do_nothing:
267 \cs_new_eq:NN \xeCJK_peek_catcode_false:w \prg_do_nothing:
268 \bool_new:N \l_xeCJK_peek_ignore_spaces_bool

```

`\xeCJK_token_value_class:N` is used to get the X_YTEX character class where the token #1 is located. #1 should be an explicit or implicit token with `\catcode` of 11 or 12.

```

269 \cs_new:Npn \xeCJK_token_value_class:N #1
270   { \tex_XeTeXcharclass:D \xeCJK_token_value_charcode:N #1 }

```

`\xeCJK_token_value_charcode:N` When the charcode of token #1 is greater than or equal to 0x10000, the return result of `\meaning` before X_YTEX version 0.9999.0 is special and needs special handling.⁴ The `\meaning` of X_YTEX from version 0.9999.0 onwards returns two characters for characters beyond BMP, corresponding to the first and last proxies of their UTF-16 encoding⁵. This bug was fixed in TeX Live 2015 version 0.99992⁶.

```

271 \cs_new:Npn \xeCJK_token_value_charcode:N #1
272   { \exp_after:wN \xeCJK_get_charcode:w \token_to_meaning:N #1 \q_stop }
273 \group_begin:
274   \cs_set:Npn \xeCJK_tmp:w #1 ~ #2 ~ #3#4#5 \q_stop
275     {
276       \tl_if_empty:nTF { #4#5 }
277       {
278         \cs_new:Npn \xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3 \q_stop
279         { \int_eval:n {`##3} }
280       }

```

⁴ See <http://tug.org/pipermail/xetex/2013-January/023967.html> and <http://tex.stackexchange.com/a/64848>.

⁵ See <http://tug.org/pipermail/xetex/2013-June/024543.html>.


```

281     {
282     \tl_if_empty:nTF {#5}
283     {
284     \cs_new:Npn \xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3##4 \q_stop
285     {
286     \int_eval:n
287     {
288     \tl_if_empty:nTF { ##4 }
289     { `##3 }
290     { ( `##3 - "D800 ) * "400 + ( `##4 - "DC00 ) + "10000 }
291     }
292     }
293     }
294     {
295     \cs_new:Npn \xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3##4 \q_stop
296     { \int_eval:n { \tl_if_empty:nTF { ##4 } { `##3 } { "20000 } }
297     }
298     }
299     }
300 \exp_after:wN \xeCJK_tmp:w \token_to_meaning:N ^^^^20000 { } \q_stop
301 \group_end:

```

`\xeCJK_if_CJK_class_p:N` Determine if character #1 is CJK character class, including text and punctuation.
`\xeCJK_if_CJK_class:NNTF`

```

302 \prg_new_conditional:Npnn \xeCJK_if_CJK_class:N #1 { p , T , F , TF }
303 {
304   \if_cs_exist:w
305     \xeCJK_CJK_class_tl:n { \xeCJK_token_value_class:N #1 }
306   \cs_end:
307   \prg_return_true: \else: \prg_return_false: \fi:
308 }
309 \cs_new:Npn \xeCJK_CJK_class_tl:n #1
310 { c xeCJK_CJK_class_ \int_eval:n { #1 } _tl }

```

`\xeCJK_if_same_class_p:NN` Determine if two characters belong to the same character class.
`\xeCJK_if_same_class:NNTF`

```

311 \prg_new_conditional:Npnn \xeCJK_if_same_class:NN #1#2 { p , T , F , TF }
312 {
313   \if_int_compare:w \xeCJK_token_value_class:N #1 =
314     \xeCJK_token_value_class:N #2 \exp_stop_f:
315   \prg_return_true: \else: \prg_return_false: \fi:
316 }

```

`\xeCJK_make_boundary:` Use `\scan_stop:` End CJK grouping used to restore fonts, etc.

```

317 \cs_new_protected:Npn \xeCJK_make_boundary:
318 { \bool_if:NT \l xeCJK_CJK_group_bool { \scan_stop: } }

```

5.3 Function Switch

`xeCJKactive` will, in fact, turn on or off the whole character class mechanism of X_ƎTEX.

```

319 \keys_define:nn { xeCJK / options }
320 {
321   xeCJKactive .voice: ,
322   xeCJKactive / true .code:n = { \makexeCJKactive      } ,
323   xeCJKactive / false .code:n = { \makexeCJKinactive } ,
324   xeCJKactive .default:n = { true }
325 }

```

```

\makexeCJKactive 326 \NewDocumentCommand \makexeCJKactive      {}
\makexeCJKinactive 327 { \tex_XeTeXinterchartokenstate:D = \c_one_int }
328 \NewDocumentCommand \makexeCJKinactive {}
329 { \tex_XeTeXinterchartokenstate:D = \c_zero_int }

```

Suppress the BOM.

```

330 \char_set_catcode_ignore:n { "FEFF }

```

5.4 Character class setting

`\g xeCJK_class_seq` is used to record the name of the character class used in `xeCJK` and the number of the newly created character class, respectively.

```
\g xeCJK_new_class_seq
331 \seq_new:N \g xeCJK_class_seq
332 \seq_new:N \g xeCJK_new_class_seq

\xeCJK_new_class:n Create a new character class. #1 is the custom name.
333 \cs_new_protected:Npn \xeCJK_new_class:n #1
334 {
335   \int_if_exist:cTF { \xeCJK_class_csname:n {#1} }
336   { \xeCJK_error:nx { class-already-defined } {#1} }
337   {
338     \exp_args:Nc \newXeTeXintercharclass
339     { \xeCJK_class_csname:n {#1} }
340     \clist_new:c { g xeCJK_#1_range_clist }
341     \seq_gput_right:Nn \g xeCJK_class_seq {#1}
342     \seq_gput_right:Nv \g xeCJK_new_class_seq
343     { \xeCJK_class_csname:n {#1} }
344   }
345 }
```

`\xeCJK_save_class:nn` Save the X_YTEX predefined character classes. #1 is the custom name and #2 is the number.

```
346 \cs_new_protected:Npn \xeCJK_save_class:nn #1#2
347 {
348   \int_if_exist:cTF { \xeCJK_class_csname:n {#1} }
349   { \xeCJK_error:nx { class-already-defined } {#1} }
350   {
351     \int_const:cn { \xeCJK_class_csname:n {#1} } {#2}
352     \clist_new:c { g xeCJK_#1_range_clist }
353     \seq_gput_right:Nn \g xeCJK_class_seq {#1}
354   }
355 }
```

`\xeCJK_class_csname:n` The name of the control sequence corresponding to the character class name.

```
356 \cs_new:Npn \xeCJK_class_csname:n #1 { c xeCJK_#1_class_int }
357 \cs_new_eq:cN { \xeCJK_class_csname:n { Others } } \xeCJK_tmp_int
358 \xeCJK_msg_new:nn { class-already-defined }
359 {
360   XeTeX~character~class~`#1'~has~been~already~defined.\\\
361   Please~take~another~name.\\\
362 }
```

`xeCJK` needs the following character categories for character output. `Default`, `CJK`, `FullLeft`, `FullRight`, `Boundary` are predefined categories in X_YTEX, and `HalfLeft`, `HalfRight`, `NormalSpace` and `CM` are newly added to `xeCJK`. Variation Selectors⁷ requires X_YTEX version 0.9999.0 or above⁸ and the associated fonts.

Category	Description	Example
<code>Default</code>	General symbols in Spanish	abc123
<code>CJK</code>	CJK Expressions	Kanji ao no pho
<code>FullLeft</code>	Full left corner punctuation	(The:”
<code>FullRight</code>	Full-corner right punctuation	,)”
<code>HalfLeft</code>	Half corner left punctuation	([{
<code>HalfRight</code>	Half-angle right punctuation	,.?)] }
<code>NormalSpace</code>	Symbols for front and back original	/

	spacing	
Boundary	Boundaries	Space
CM	Combined logo	Variant character selector
HangulJamo	Korean alphabet	한글

⁷ <http://www.unicode.org/reports/tr37/>

⁸ <http://tug.org/pipermail/xetex/2013-March/024118.html>

Default CJK `\xeCJK_save_class:nn { Default } { 0 }`
 FullLeft X_YTEX 0.99994 expands the total number of character classes to 4096⁹.

```

FullRight Boundary
364 \str_const:Nx \c xeCJK_xetex_version_str
365 { \int_use:N \tex_XeTeXversion:D \tex_XeTeXrevision:D }
366 \fp_compare:nNnTF { \c xeCJK_xetex_version_str } > { 0.99993 }
367 { \xeCJK_save_class:nn { Boundary } { 4095 }
368 { \xeCJK_save_class:nn { Boundary } { 255 }

```

L^AT_EX 2_ε 2016/02/01 No more pre-setting CJK character classes.

```

369 \int_compare:nNnTF { \tex_XeTeXcharclass:D "4E00 } = \c_one_int
370 {
371   \xeCJK_save_class:nn { CJK } { 1 }
372   \xeCJK_save_class:nn { FullLeft } { 2 }
373   \xeCJK_save_class:nn { FullRight } { 3 }
374   \int_const:Nn \c xeCJK_class_begin_int { 3 }
375 }
376 {
377   \xeCJK_new_class:n { CJK }
378   \xeCJK_new_class:n { FullLeft }
379   \xeCJK_new_class:n { FullRight }
380   \int_const:Nn \c xeCJK_class_begin_int { 0 }
381 }

```

HalfLeftNew half-angle left/right punctuation, front/back original spacing symbols and variant character selector classes for Western languages.

```

HalfRight
NormalSpace CM
HangulJamo
382 \xeCJK_new_class:n { HalfLeft }
383 \xeCJK_new_class:n { HalfRight }
384 \xeCJK_new_class:n { NormalSpace }
385 \xeCJK_new_class:n { CM }
386 \xeCJK_new_class:n { HangulJamo }

```

`\c xeCJK_HalfLeft_chars_clist` The character class for western half-left/right punctuation and front/back original spacing.

```

\c xeCJK_HalfRight_chars_clist
\c xeCJK_NormalSpace_chars_clist
387 \clist_const:Nn \c xeCJK_HalfLeft_chars_clist
388 { "28 , "5B , "60 , "7B , "2329 }
389 \clist_const:Nn \c xeCJK_HalfRight_chars_clist
390 { "21 , "22 , "25 , "27 , "29 , "2C , "2E , "3A , "3B , "3F , "5D , "7D , "232A }
391 \clist_const:Nn \c xeCJK_NormalSpace_chars_clist { "2D , "2F , "5C }

```

The following categorization of full-angle punctuation is derived from the X_YTEX script [unicode-char-prep.pl](#) and the Unicode database¹⁰.

`\c xeCJK_OP_chars_clist` Open Punctuation (OP)

U+2018	▪	U+201C	••	U+3008	<	U+300A	Th	U+300C	"Th	U+300E	『	U+3010	[【
U+3014	[	U+3016	【	U+3018	⌈	U+301A	e	U+301D	e	U+FE17	⌋	U+FE35	(
U+FE37	Filed	U+FE39	Brown	U+FE3B	issue	U+FE3D	Action	U+FE3F	My	U+FE41	Theo	U+FE43	Host
U+FE47	⌋	U+FE59	((	U+FE5B	Classes	U+FE5D	(English).	U+FF08	(	U+FF3B	[	U+FF5B	{
U+FF5F	((	U+FF62	"The										

The first line of the following code is a left quotation mark shared by Chinese and Western languages.

```

392 \clist_const:Nn \c xeCJK_OP_chars_clist
393 {
394   "2018 , "201C ,
395   "3008 , "300A , "300C , "300E , "3010 , "3014 , "3016 , "3018 , "301A , "301D ,
396   "FE17 , "FE35 , "FE37 , "FE39 , "FE3B , "FE3D , "FE3F , "FE41 , "FE43 , "FE47 ,

```

397 "FE59 , "FE5B , "FE5D , "FF08 , "FF3B , "FF5B , "FF5F , "FF62
398 }

⁹ <http://tug.org/pipermail/xetex/2016-February/026363.html>

¹⁰ <http://www.unicode.org/reports/tr14/>

\c xeCJK_PR_chars_clist Prefix Numeric (PR)

```

    | U+FE69 | $ $ U+FF04 | $ F U+FFE1 | £ | U+FFE5 | ¥ | U+FFE6 | W |
399 \clist_const:Nn \c xeCJK_PR_chars_clist
400 { "FE69 , "FF04 , "FFE1 , "FFE5 , "FFE6 }

```

The above two types of punctuation marks appear on the left side of the text and should not appear at the end of the line.

```

401 \clist_new:N \c xeCJK_FullLeft_chars_clist
402 \clist_gconcat:NNN \c xeCJK_FullLeft_chars_clist
403 \c xeCJK_OP_chars_clist
404 \c xeCJK_PR_chars_clist

```

\c xeCJK_CL_chars_clist Close Punctuation (CL)

U+00B7	-	U+2019	▪	U+201D	⋄	U+2013	-	U+2014	-	U+2025	⋯	U+2026	⋯
U+2027	·	U+2E3A	—P d_2E 3A	U+3001	,,	U+3002	.	U+3009	>	U+300B	》	U+300D	」
U+300F	』	U+3011	]	U+3015	The]	U+3017	)	U+3019	)	U+301B	] ]	U+301E	
U+301F		U+FE11	,	U+FE12	°	U+FE18	☞	U+FE36	Oh	U+FE38	〰	U+FE3A	All
U+FE3C	Spe cifi cati ons	U+FE3E	Laun dry	U+FE40	✓	U+FE42	The	U+FE44	Ne ws	U+FE48	┌	U+FE50	The
U+FE52	S	U+FE5A	(Engl ish)	U+FE5C	}	U+FE5E	)	U+FF09	)	U+FF0C	,,	U+FF0E	The
U+FF3D	] ]	U+FF5D	The }	U+FF60	)	U+FF61	.	U+FF63	T he "C	U+FF64	,,		

The first line of the code below shows some punctuation marks that are common to both Chinese and Western languages.

```

405 \clist_const:Nn \c xeCJK_CL_chars_clist
406 {
407   "00B7 , "2019 , "201D , "2013 , "2014 , "2025 , "2026 , "2027 , "2E3A ,
408   "3001 , "3002 , "3009 , "300B , "300D , "300F , "3011 , "3015 , "3017 , "3019 ,
409   "301b , "301E , "301f , "FE11 , "FE12 , "FE18 , "FE36 , "FE38 , "FE3A , "FE3C ,
410   "FE3E , "FE40 , "FE42 , "FE44 , "FE48 , "FE50 , "FE52 , "FE5A , "FE5C , "FE5E ,
411   "ff09 , "ff0c , "ff0e , "ff3d , "ff5d , "ff60 , "ff61 , "ff63 , "ff64
412 }

```

\c xeCJK_NS_chars_clist Nonstarter (NS)

```

    U+30FB · U+FE54 U+FE55 U+FF1A : U+FF1B U+FF65 U+FF1A U+16FE0
Hyphens (cl-03)

```

```

    | U+301C | | U+30A0 | = | U+FF5E | ~ |
Iteration marks (cl-09) ~

```

```

    | U+3005 | 々 | U+303B U+309D U+309E 々 U+30FD U+30FE 々
    々 | | Sister | | | \ | | | |

```

According to the W3C¹¹ According to the W3C, cl-03 and cl-09 can have no ban rule in very loose cases. We just put the full-angle wavy U+FF5E and other connection numbers into the FullRight class and set them to MiddlePunct at the end of the macro package.

```

413 \clist_const:Nn \c xeCJK_hyphens_chars_clist
414 { "301C , "30A0 , "FF5E }
415 \clist_const:Nn \c xeCJK_iteration_marks_chars_clist
416 { "3005 , "303B , "309D , "309E , "30FD , "30FE }
417 \clist_const:Nn \c xeCJK_NS_chars_clist

```

```

418 { "30FB , "FE54 , "FE55 , "FF1A , "FF1B , "FF65 , "16FE0 }
419 \AtEndOfPackage
420 {
421   \cs_set:Npn \xeCJK_tmp:w #1
422     { \char_generate:nn { #1 } { 12 } }
423   \xeCJK_add_special_punct:nn { middle }
424     { \clist_map_function:NN \c xeCJK_hyphens_chars_clist \xeCJK_tmp:w }
425   \cs_undefine:N \xeCJK_tmp:w
426 }

```

\c xeCJK_EX_chars_clist **Exclamation/Interrogation (EX)**

| U+FE15 | ! | U+FE16 | ? | U+FE56 | U+FE57 | U+FF01 | U+FF01! | U+FF1F
 U+FF1F?

```

427 \clist_const:Nn \c xeCJK_EX_chars_clist
428 { "FE15 , "FE16 , "FE56 , "FE57 , "FF01 , "FF1F }

```

¹¹<http://www.w3.org/TR/jlreq/>

\c xeCJK_IS_chars_clist Infix Numeric Separator (IS)

| U+FE10 | ' | U+FE13 | : | U+FE14 | ; |

```
429 \clist_const:Nn \c xeCJK_IS_chars_clist { "FE10 , "FE13 , "FE14 }
```

\c xeCJK_CJ_chars_clist Conditional Japanese Starter (CJ). The prohibition of these characters is optional¹² For the sake of simplicity of implementation we put them into CJK class, i.e., they have no rules.

U+3041	aa	U+3043	No	U+3045	Philippines	U+3047	Payment	U+3049	Footsteps	U+3063	つ	U+3083	や
U+3085	Name	U+3087	Date	U+308E	stop fooling around	U+3095	か	U+3096	け	U+30A1	A	U+30A3	Name
U+30A5	Photo	U+30A7	エ	U+30A9	オ	U+30C3	ツ	U+30E3	Contact	U+30E5	ユ	U+30E7	ヨ
U+30EE	meggg	U+30F5	Compared to	U+30F6	G	U+30FC	ー	U+31F0	ク	U+31F1	シ	U+31F2	ス
U+31F3	ト	U+31F4	ヌ	U+31F5	ハ	U+31F6	ヒ	U+31F7	フ	U+31F8	ヘ	U+31F9	ホ
U+31FA	ム	U+31FB	ラ	U+31FC	リ	U+31FD	ル	U+31FE	レ	U+31FF	ロ	U+FF67	A
U+FF68	Name	U+FF69	Photo	U+FF6A	エ	U+FF6B	オ	U+FF6C	Contact	U+FF6D	ユ	U+FF6E	ヨ
U+FF6F	ツ	U+FF70	ー										

```
430 \clist_const:Nn \c xeCJK_CJ_chars_clist
431 {
432   "3041 , "3043 , "3045 , "3047 , "3049 , "3063 , "3083 , "3083 , "3085 , "3087 , "308E ,
433   "3095 , "3096 , "30A1 , "30A3 , "30A5 , "30A7 , "30A9 , "30C3 , "30E3 , "30E5 ,
434   "30E7 , "30EE , "30F5 , "30F6 , "30FC , "31F0 , "31F1 , "31F2 , "31F3 , "31F4 ,
435   "31f5 , "31f6 , "31f7 , "31f8 , "31f9 , "31fa , "31fb , "31fc , "31fd , "31fe ,
436   "31FF , "FF67 , "FF68 , "FF69 , "FF6A , "FFB , "FF6C , "FF6D , "FF6E , "FF6F ,
437   "FF70
438 }
```

\c xeCJK_PO_chars_clist Postfix Numeric (PO)

| U+FE6A | % | | % | U+FFE0 | ¢ |

U+FF05

```
439 \clist_const:Nn \c xeCJK_PO_chars_clist { "FE6A , "FF05 , "FFE0 }
```

\c xeCJK_FullRight_chars_clist The above six types of punctuation marks appear on the right side of the text and should not appear at the beginning of the line.

```
440 \clist_new:N \c xeCJK_FullRight_chars_clist
441 \tl_map_inline:nn
442 {
443   \c xeCJK_CL_chars_clist
444   \c xeCJK_NS_chars_clist
445   \c xeCJK_EX_chars_clist
446   \c xeCJK_IS_chars_clist
447   \c xeCJK_PO_chars_clist
448   \c xeCJK_hyphens_chars_clist
449 }
450 {
451   \clist_gconcat:NNN \c xeCJK_FullRight_chars_clist
452   \c xeCJK_FullRight_chars_clist #1
453 }
```


`\cxeCJK_CJK_chars_clist` CJK character class, including text and punctuation.

```
454 \clist_const:Nn \c xeCJK_CJK_chars_clist
455 {
```

- Minnan and Hakka Yin-de and Yang-de tone marks

```
456 "02EA -> "02EB ,
```

- CJK Radicals Supplement (CJK Radicals Supplement)

```
457 "2E80 -> "2EFF ,
```

- Kangxi Radicals (Kangxi radicals)

```
458 "2F00 -> "2FDF ,
```

¹² <https://github.com/CTeX-org/ctex-kit/issues/165>

- Ideographic Description Characters (ideographic descriptors)
459 "2FF0 -> "2FFF ,
- CJK Symbols and Punctuation (CJK Symbols and Punctuation)
460 "3000 -> "303F ,
- Hiragana (Japanese Hiragana)
461 "3040 -> "309F ,
- Katakana (Japanese Katakana)
462 "30A0 -> "30FF ,
- Bopomofo (phonetic alphabet)
463 "3100 -> "312F ,
- Hangul Compatibility Jamo (Proverbial Compatibility Alphabet)
464 "3130 -> "318F ,
- Kanbun (hieroglyphic annotation mark)
465 "3190 -> "319F ,
- Bopomofo Extended (phonetic alphabet extension)
466 "31A0 -> "31BF ,
- CJK Strokes (CJK Strokes)
467 "31C0 -> "31EF ,
- Katakana Phonetic Extensions (Japanese Katakana phonetic extensions)
468 "31F0 -> "31FF ,
- Enclosed CJK Letters and Months (with circled CJK letters and months)
469 "3200 -> "32FF ,
- CJK Compatibility (CJK Compatible)
470 "3300 -> "33FF ,
- CJK Unified Ideographs Extension-A (CJK Unified Ideographs Extension A)
471 "3400 -> "4DBF ,
- Yijing Hexagrams Symbols (Yijing Hexagrams Symbols)
472 "4DC0 -> "4DFF ,
- CJK Unified Ideographs (Chinese, Japanese and Korean Unified Ideographs)
473 "4E00 -> "9FFF ,
- Yi Syllables (Yi Syllables)
474 "A000 -> "A48F ,
- Yi Radicals (Yi script root)
475 "A490 -> "A4CF ,
- Hangul Syllables (proverbial syllables)
476 "AC00 -> "D7AF ,
- CJK Compatibility Ideographs (CJK compatible ideographs)
477 "F900 -> "FAFF ,
- Vertical Forms
478 "FE10 -> "FE1F ,

- CJK Compatibility Forms (CJK compatible forms)
479 "FE30 -> "FE4F ,
- Halfwidth and Fullwidth Forms
480 "FF00 -> "FFEF ,
- Ideographic Symbols and Punctuation
481 "16FE0 -> "16FFF ,
- Tangut (Xixia language)
482 "17000 -> "187FF ,
- Tangut Components (Xixian radicals)
483 "18800 -> "18AFF ,
- Khitan Small Script (契丹小字)
484 "18B00 -> "18CFF ,
- Tangut Supplement (Xixia Text Supplement)
485 "18D00 -> "18D7F ,
- Kana Extended-B (Japanese kana extension B)
486 "1AFF0 -> "1AFFF ,
- Kana Supplement (Japanese kana supplement)
487 "1B000 -> "1B0FF ,
- Kana Extended-A (Japanese kana extended A)
488 "1B100 -> "1B12F ,
- Small Kana Extension (small Japanese kana extension)
489 "1B130 -> "1B16F ,
- Nushu (Women's Book)
490 "1B170 -> "1B2FF ,
- Enclosed Ideographic Supplement
491 "1F200 -> "1F2FF ,
- CJK Unified Ideographs Extension-B (CJK Unified Ideographs Extension B)
492 "20000 -> "2A6DF ,
- CJK Unified Ideographs Extension-C (CJK Unified Ideographs Extension C)
493 "2A700 -> "2B73F ,
- CJK Unified Ideographs Extension-D (CJK Unified Ideographs Extension D)
494 "2B740 -> "2B81F ,
- CJK Unified Ideographs Extension-E (CJK Unified Ideographs Extension E)
495 "2B820 -> "2CEAF ,
- CJK Unified Ideographs Extension-F (CJK Unified Ideographs Extension F)
496 "2CEB0 -> "2EBEF ,
- CJK Compatibility Ideographs Supplement (CJK Compatibility Ideographs Supplement)
497 "2F800 -> "2FA1F ,
- CJK Unified Ideographs Extension-G (CJK Unified Ideographs Extension G)
498 "30000 -> "3134F

```
499 }
```

`\c xecjk_cm_chars_clist` includes Japanese kana cloud dots and variant character selectors. The combination mark is best to be classified into class 256, i.e. transparent class, which will not affect the state. However, it can cause some problems. For example, in the following example, the “two” at the end of the line causes a grouping mismatch.

```
\XeTeXinterchartokenstate=1
\XeTeXcharclass`ii=256
\XeTeXinterchartoks 255 1 = {\bgroup}
\XeTeXinterchartoks 1 255 = {\egroup}
\XeTeXinterchartoks 1 1 = {x}
\font\zhfont="SimSun"
\zhfont
One, two, three, two
\bye

500 \clist_const:Nn \c xecjk_cm_chars_clist
501 {
```

- Diacritics (Tone Signatures)

```
502 "302A -> "302F ,
```

- Japanese kana dots

```
503 "3099 -> "309A ,
```

- Variation Selectors

```
504 "FE00 -> "FE0F ,
```

- Variation Selectors Supplement

```
505 "E0100 -> "E01EF
```

```
506 }
```

`\c xecjk_hanguljamo_chars_clist` Korean alphabet.

```
507 \clist_const:Nn \c xecjk_hanguljamo_chars_clist
508 {
```

- Hangul Jamo (proverbial alphabet)

```
509 "1100 -> "11FF ,
```

- Hangul Jamo Extended-A (Proverbs Extended A)

```
510 "A960 -> "A97F ,
```

- Hangul Jamo Extended-B (Proverbs Extended B)

```
511 "D7B0 -> "D7FF
```

```
512 }
```

5.5 Character Class Handling

`\xecjk_class_num:n #1` is the name of the character class, used to get the number corresponding to the character class.

```
513 \cs_new:Npn \xecjk_class_num:n #1
514 { \use:c { \xecjk_class_csname:n {#1} } }
```

```
\xecjkDeclareCharClass 515 \NewDocumentCommand \xecjkDeclareCharClass { s > { \TrimSpaces } m m }
```

```
516 {
517   \xecjk_declare_char_class:nn {#2} {#3}
518   \IfBooleanT {#1} { \xecjkResetPunctClass }
519 }
```

`\xeCJK_declare_char_class:n` is used to set the class to which the character belongs, `#1` is the class name, `#2` is the Unicode of the character, and the adjacent characters are separated by a half-comma.

`\xeCJK_declare_char_class:nN` supports the usage similar to "1100->11FF" start/stop range.

`\xeCJK_set_char_class_aux:Nnw`

```

520 \cs_new_protected:Npn \xeCJK_declare_char_class:n #1#2
521 {
522   \clist_set:Nx \l_xeCJK_tmp_clist {#2}
523   \xeCJK_declare_char_class:nN {#1} \l_xeCJK_tmp_clist
524 }
525 \cs_new_protected:Npn \xeCJK_declare_char_class:nN #1#2
526 {
527   \clist_gconcat:ccN
528     { g_xeCJK_#1_range_clist } { g_xeCJK_#1_range_clist } #2
529   \clist_map_inline:Nn #2
530     {
531       \str_if_eq:nnF {##1} { -> }
532       {
533         \xeCJK_set_char_class_aux:Nnw \xeCJK_set_char_class:nnn {##1}
534         { \xeCJK_class_num:n {#1} }
535       }
536     }
537   \xeCJK_set_char_class:nnn { "3099 } { "309A } { \xeCJK_class_num:n { CM }
538 }
539 \NewDocumentCommand \xeCJK_set_char_class_aux:Nnw
540 { m > { \SplitArgument { 1 } { -> } } m } { #1 #2 }
541 \cs_generate_variant:Nn \clist_gconcat:NNNN { cc }

```

`\xeCJK_check_num_range:nnNN`

```

542 \cs_new_protected:Npn \xeCJK_check_num_range:nnNN #1#2#3#4
543 {
544   \bool_lazy_or:nnTF
545     { \tl_if_blank_p:n {#1} }
546     { \tl_if_blank_p:n {#2} }
547     {
548       \int_set:Nn #3 { \tl_if_blank:nTF {#1} {#2} {#1} }
549       \int_set_eq:NN #3 #4
550     }
551     {
552       \int_set:Nn #3 { \int_min:nn {#1} { \tl_if_novalue:nTF {#2} {#1} {#2} } }
553       \int_set:Nn #4 { \int_max:nn {#1} { \tl_if_novalue:nTF {#2} {#1} {#2} } }
554     }
555 }

556 \token_if_letter:NF ^^^^ac00
557 {
558   \int_set:Nn \l_xeCJK_begin_int { "AC00 }
559   \int_set:Nn \l_xeCJK_end_int { "D7A3 }
560   \xeCJK_int_until_do:nn { \l_xeCJK_begin_int > \l_xeCJK_end_int }
561   {
562     \char_set_catcode_letter:n { \l_xeCJK_begin_int }
563     \int_incr:N \l_xeCJK_begin_int
564   }
565 }

```

`\xeCJK_set_char_class:nnnn` Set the character class, `#1` and `#2` are the Unicode from which the character class starts and ends, `#3` is the corresponding number of the class name.

```

566 \cs_new_protected:Npn \xeCJK_set_char_class:nnn #1#2#3
567 {
568   \xeCJK_check_num_range:nnNN {#1} {#2} \l_xeCJK_begin_int \l_xeCJK_end_int
569   \int_set:Nn \l_xeCJK_tmp_int {#3}
570   \xeCJK_int_until_do:nn { \l_xeCJK_begin_int > \l_xeCJK_end_int }
571   {
572     \tex_XeTeXcharclass:D \l_xeCJK_begin_int = \l_xeCJK_tmp_int
573     \int_incr:N \l_xeCJK_begin_int
574   }
575 }

```

`\xeCJK_set_char_class_eq:nn` Set all characters in character class `#1` to character class `#2`. Only apply to the case where the character class range of `#1` is a discrete comma list.

```

576 \cs_new_protected:Npn \xeCJK_set_char_class_eq:nn #1#2

```

```

577 {
578   \int_set:Nn \l xeCJK_tmp_int { \xeCJK_class_num:n {#2} }
579   \clist_map_inline:cn { c xeCJK_#1_chars_clist }
580     { \tex_XeTeXcharclass:D ##1 = \l xeCJK_tmp_int }
581 }

```

\normalspacedchars Declare unspaced characters before and after.

```

582 \NewDocumentCommand \normalspacedchars { m }
583 {
584   \tl_map_inline:nn {#1}
585     { \tex_XeTeXcharclass:D `##1 = \xeCJK_class_num:n { NormalSpace } }
586 }

```

\xeCJKResetPunctClass is used to reset the character class to which the **punctuation** mark belongs.

```

587 \NewDocumentCommand \xeCJKResetPunctClass { }
588 {
589   \clist_gclear:N \g xeCJK_HalfLeft_range_clist
590   \clist_gclear:N \g xeCJK_HalfRight_range_clist
591   \clist_gclear:N \g xeCJK_FullLeft_range_clist
592   \clist_gclear:N \g xeCJK_FullRight_range_clist
593   \xeCJK_declare_char_class:nN { HalfLeft } \c xeCJK_HalfLeft_chars_clist
594   \xeCJK_declare_char_class:nN { HalfRight } \c xeCJK_HalfRight_chars_clist
595   \xeCJK_declare_char_class:nN { FullLeft } \c xeCJK_FullLeft_chars_clist
596   \xeCJK_declare_char_class:nN { FullRight } \c xeCJK_FullRight_chars_clist
597 }

```

\xeCJKResetCharClass is used to restore **xeCJK**'s setting for character class.

```

598 \NewDocumentCommand \xeCJKResetCharClass { }
599 {
600   \clist_gclear:N \g xeCJK_CJK_range_clist
601   \clist_gclear:N \g xeCJK_NormalSpace_range_clist
602   \clist_gclear:N \g xeCJK_CM_range_clist
603   \clist_gclear:N \g xeCJK_HangulJamo_range_clist
604   \xeCJK_declare_char_class:nN { CJK } \c xeCJK_CJK_chars_clist
605   \xeCJK_declare_char_class:nN { NormalSpace } \c xeCJK_NormalSpace_chars_clist
606   \xeCJK_declare_char_class:nN { CM } \c xeCJK_CM_chars_clist
607   \xeCJK_declare_char_class:nN { HangulJamo } \c xeCJK_HangulJamo_chars_clist
608   \xeCJKResetPunctClass
609 }

```

Set the character class.

```

610 \xeCJKResetCharClass

```

\xeCJK_inter_class_toks:nmn Insert content between adjacent classes.

```

611 \cs_new_protected:Npn \xeCJK_inter_class_toks:nnn #1#2#3
612 {
613   \tex_XeTeXinterchartoks:D \xeCJK_class_num:n {#1} ~
614     \xeCJK_class_num:n {#2} = {#3}
615 }
616 \cs_generate_variant:Nn \xeCJK_inter_class_toks:nnn { nne }

```

\xeCJK_get_inter_class_toks:nn Fetch the content between adjacent classes.

```

617 \cs_new:Npn \xeCJK_get_inter_class_toks:nn #1#2
618 {
619   \tex_the:D \tex_XeTeXinterchartoks:D \xeCJK_class_num:n {#1} ~
620     \xeCJK_class_num:n {#2}
621 }

```

\xeCJK_clear_inter_class_toks:nn Clear the content between adjacent classes. Note that assigning null values directly may cause X_YTEX to crash. For example

```

\XeTeXinterchartokenstate = 1
\XeTeXcharclass A=10
\XeTeXinterchartoks 10 10 = {xx}
\begingroup
  \XeTeXinterchartoks 10 10 = {} AA
\endgroup
\bye

```

If you `remove` the groups `\begingroup` and `\endgroup` from the above example, the result is normal and very strange. Here

The X_YTEX bug has been fixed in version 0.999992.¹³

```

622 \cs_new_protected:Npn \xeCJK_clear_inter_class_toks:nn #1#2
623   { \xeCJK_inter_class_toks:nnn {#1} {#2} { \prg_do_nothing: }

```

`\xeCJK_pre_inter_class_toks:nnn` Add content before the content that already exists between adjacent classes.

```

624 \cs_new_protected:Npn \xeCJK_pre_inter_class_toks:nnn #1#2#3
625   {
626     \xeCJK_inter_class_toks:nne {#1} {#2}
627     { \exp_not:n {#3} \xeCJK_get_inter_class_toks:nn {#1} {#2} }
628   }
629 \cs_generate_variant:Nn \xeCJK_pre_inter_class_toks:nnn { nne }

```

`\xeCJK_app_inter_class_toks:nnn` Append content after the content that already exists between adjacent classes.

```

630 \cs_new_protected:Npn \xeCJK_app_inter_class_toks:nnn #1#2#3
631   {
632     \xeCJK_inter_class_toks:nne {#1} {#2}
633     { \xeCJK_get_inter_class_toks:nn {#1} {#2} \exp_not:n {#3} }
634   }
635 \cs_generate_variant:Nn \xeCJK_app_inter_class_toks:nnn { nne }

```

`\xeCJK_copy_inter_class_toks:nnnn` Copy the content between #3 and #4 to between #1 and #2.

```

636 \cs_new_protected:Npn \xeCJK_copy_inter_class_toks:nnnn #1#2#3#4
637   {
638     \tl_set:Nx \l xeCJK_tmp_tl
639     { \xeCJK_get_inter_class_toks:nn {#3} {#4} }
640     \tl_if_empty:NTF \l xeCJK_tmp_tl
641     {
642       \tl_set:Nx \l xeCJK_tmp_tl
643       { \xeCJK_get_inter_class_toks:nn {#1} {#2} }
644       \tl_if_empty:NF \l xeCJK_tmp_tl
645       { \xeCJK_clear_inter_class_toks:nn {#1} {#2} }
646     }
647     { \xeCJK_inter_class_toks:nne {#1} {#2} { \exp_not:o \l xeCJK_tmp_tl } }
648   }

```

`\xeCJK_replace_inter_class_toks:nnnn` Replace #3 between #1 and #2 with #4.

```

649 \cs_new_protected:Npn \xeCJK_replace_inter_class_toks:nnnn #1#2#3#4
650   {
651     \tl_set:Nx \l xeCJK_tmp_tl
652     { \xeCJK_get_inter_class_toks:nn {#1} {#2} }
653     \tl_if_empty:NF \l xeCJK_tmp_tl
654     {
655       \tl_replace_all:Nnn \l xeCJK_tmp_tl {#3} {#4}
656       \xeCJK_inter_class_toks:nne {#1} {#2}
657       { \exp_not:o \l xeCJK_tmp_tl }
658     }
659   }

```

`\xeCJK_clear_Boundary_and_CJK_toks:` Clear the content between the boundary and CJK textfull-corner left and right punctuation.

```

660 \cs_new_protected:Npn \xeCJK_clear_Boundary_and_CJK_toks:
661   {}
662 \cs_new_protected:Npn \xeCJK_update_clear_toks:n #1
663   {

```

¹³ <http://tug.org/svn/texlive?view=revision&revision=53880>

```

664 \cs_gset_protected:Npx \xeCJK_clear_Boundary_and_CJK_toks:
665 {
666   \exp_not:o { \xeCJK_clear_Boundary_and_CJK_toks: }
667   \tex_XeTeXinterchartoks:D
668   \xeCJK_class_num:n { Boundary } ~
669   \xeCJK_class_num:n { #1 } = { \exp_not:N \prg_do_nothing: }
670 }
671 }

```

`\g_xeCJK_base_class_seq` Save the pre-defined character classes of macro packages.
`\g_xeCJK_non_CJK_class_seq`

```

672 \seq_new:N \g_xeCJK_base_class_seq
673 \seq_gset_eq:NN \g_xeCJK_base_class_seq \g_xeCJK_class_seq
674 \seq_new:N \g_xeCJK_non_CJK_class_seq
675 \seq_gset_from_clist:Nn \g_xeCJK_non_CJK_class_seq
676 { Default , HalfLeft , HalfRight , NormalSpace , Boundary }
677 \seq_new:N \g_xeCJK_CJK_class_seq
678 \cs_new_protected:Npn \xeCJK_save_CJK_class:n #1
679 {
680   \seq_gput_right:Nn \g_xeCJK_CJK_class_seq {#1}
681   \tl_const:cn
682   { \xeCJK_CJK_class_tl:n { \use:c { \xeCJK_class_csname:n {#1} } }
683     {#1}
684   \xeCJK_update_clear_toks:n {#1}
685 }
686 \clist_map_function:nN
687 { CJK , FullLeft , FullRight , CM , HangulJamo } \xeCJK_save_CJK_class:n

```

5.6 Character output rules

	Default	CJK	FullL	FullR	HalfL	HalfR	Normal	Bound	CM
Default		✓	✓	✓				✓	✓
CJK	✓	✓	✓	✓	✓	✓	✓	✓	
FullLeft	✓	✓	✓	✓	✓	✓	✓	✓	✓
FullRight	✓	✓	✓	✓	✓	✓	✓	✓	✓
HalfLeft		✓	✓	✓					✓
HalfRight		✓	✓	✓				✓	✓
NormalSpace		✓	✓	✓				✓	✓
Boundary	✓	✓	✓	✓	✓		✓		✓
CM	✓	✓	✓	✓	✓	✓	✓	✓	✓

`\xeCJK_class_group_begin:` Set `\XeTeXdashbreakstate` to zero at the beginning of the CJK class to avoid line breaks between dashes.
`\xeCJK_class_group_end:`

```

688 \cs_new_protected:Npn \xeCJK_class_group_begin:
689 {
690   \c_group_begin_token
691   \bool_set_true:N \l_xeCJK_CJK_group_bool
692   \xeCJK_reset_space_factor:
693   \int_zero:N \tex_XeTeXdashbreakstate:D
694 }
695 \bool_new:N \l_xeCJK_CJK_group_bool
696 \cs_new_eq:NN \xeCJK_class_group_end: \c_group_end_token

```

The CM character class is basically the same as the CJK character class, except that no content is added when transferring from CJK to CM.

```

697 \AtEndOfPackage
698 {
699   \seq_map_inline:Nn \g_xeCJK_class_seq
700   {
701     \str_if_eq:nnTF {#1} { CM }
702     { \xeCJK_copy_inter_class_toks:nnnn { CM } {#1} { CJK } { CJK }
703     {

```



```

704         \xeCJK_copy_inter_class_toks:nnnn { CM } {#1} { CJK } {#1}
705         \str_if_eq:nnF {#1} { CJK }
706         { \xeCJK_copy_inter_class_toks:nnnn {#1} { CM } {#1} { CJK } }
707     }
708 }
709 }

```

HangulJamo character class is basically the same as CJK character class, except that HangulJamo class does not add any content between them.

```

710 \AtEndOfPackage
711 {
712     \seq_map_inline:Nn \g_xeCJK_class_seq
713     {
714         \str_if_eq:nnF {#1} { HangulJamo }
715         {
716             \xeCJK_copy_inter_class_toks:nnnn { HangulJamo } {#1} { CJK } {#1}
717             \xeCJK_copy_inter_class_toks:nnnn {#1} { HangulJamo } {#1} { CJK }
718         }
719     }
720 }
721 \clist_map_inline:nn { Default , HalfLeft , HalfRight , NormalSpace }
722 {
723     \xeCJK_inter_class_toks:nnn {#1} { CJK }
724     {
725         \xeCJK_class_group_begin:
726         \xeCJK_select_font:
727         \xeCJK_clear_inter_class_toks:nn {#1} { CJK }
728         \xeCJK_clear_Boundary_and_CJK_toks:
729         \xeCJK_fallback_symbol:NN
730         \CJKsymbol
731     }
732     \xeCJK_inter_class_toks:nnn { CJK } {#1} { \xeCJK_class_group_end: }
733 }
734 \clist_map_inline:nn { Default , HalfLeft }
735 {
736     \xeCJK_inter_class_toks:nnn { Boundary } {#1}
737     { \xeCJK_Boundary_and_Default: }
738     \xeCJK_app_inter_class_toks:nnn { CJK } {#1}
739     { \CJKecglue }
740 }

```

```

\cs_new_protected:Npn \xeCJK_Boundary_and_Default:
741 { \xeCJK_check_for_ecglue: }
742 \cs_new_protected:Npn \xeCJK_check_for_xecglue:
743 {
744     \xeCJK_if_last_glue:TF
745     { \xeCJK_replace_space: }
746     { \xeCJK_check_for_ecglue: }
747 }
748 \cs_new_protected:Npn \xeCJK_check_for_ecglue:
749 {
750     \xeCJK_if_last_node:nTF { CJK }
751     { \use_i:nn }
752     { \xeCJK_if_last_node:nTF { CJK-widow } }
753     { \xeCJK_remove_node: \CJKecglue }
754     {
755         \xeCJK_if_last_node:nT { CJK-space }
756         { \xeCJK_remove_node: \xeCJK_space_or_xecglue: }
757     }
758 }
759 }
760 \cs_new_eq:NN \xeCJK_check_for_xecglue: \xeCJK_check_for_ecglue:

```

`\xeCJK_replace_space:` Replace the space with `\CJKecglue`. Note that the glue generated by `\leaders`, etc., does not return correctly. The good thing is that `\hrulefill` and `\dotfill` definitions commonly used in LATEX 2 ϵ are protected by `\kern\z@` at the end of their definitions.


```

762 {
763   \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
764   \tex_unskip:D
765   \xeCJK_if_last_node:nTF { CJK-space }
766     { \xeCJK_remove_node: \CJKe glue }
767     {
768       \xeCJK_if_last_node:nTF { CJK }
769         {
770           \skip_if_eq:nnTF
771             { \l xeCJK_last_skip }
772             { \c_xeCJK_space_skip_tl }
773             { \xeCJK_remove_node: \CJKe glue }
774             { \skip_horizontal:N \l xeCJK_last_skip }
775           }
776           { \skip_horizontal:N \l xeCJK_last_skip }
777         }
778     }
779 \skip_new:N \l xeCJK_last_skip

780 \clist_map_inline:nn { Default , HalfRight }
781 {
782   \xeCJK_inter_class_toks:nnn {#1} { Boundary }
783   {
784     \int_gset_eq:NN \g xeCJK_space_factor_int \tex_spacefactor:D
785     \peek_meaning_remove:NTF \tex_italiccorrection:D
786     {
787       \tex_italiccorrection:D
788       { \xeCJK_make_node:n { default } }
789     }
790     {
791       \token_if_space:NTF \l_peek_token
792       { \xeCJK_make_space_node: }
793       { { { \xeCJK_make_node:n { default } } } }
794     }
795   }
796   \xeCJK_pre_inter_class_toks:nnn {#1} { CJK } { \CJKe glue }
797 }

798 \xeCJK_inter_class_toks:nnn { Boundary } { NormalSpace }
799 { \xeCJK_Boundary_and_NormalSp: }

\xeCJK_Boundary_and_NormalSp: 800 \cs_new_protected:Npn \xeCJK_Boundary_and_NormalSp:
801   { \xeCJK_check_for_ecglue_normalsp: }
802 \cs_new_protected:Npn \xeCJK_check_for_xecglue_normalsp:
803   {
804     \xeCJK_if_last_glue:TF
805       { \xeCJK_replace_space: }
806       { \xeCJK_check_for_ecglue_normalsp: }
807   }
808 \cs_new_protected:Npn \xeCJK_check_for_ecglue_normalsp:
809   {
810     \xeCJK_if_last_node:nT { CJK-space }
811     { \xeCJK_remove_node: \xeCJK_space_or_xecglue: }
812   }
813 \cs_new_eq:NN \xeCJK_check_for_ecglue_normalsp:
814   \xeCJK_check_for_ecglue_normalsp:

815 \xeCJK_inter_class_toks:nnn { NormalSpace } { Boundary }
816 {
817   \int_gset_eq:NN \g xeCJK_space_factor_int \tex_spacefactor:D
818   \peek_meaning_remove:NTF \tex_italiccorrection:D
819   {
820     \tex_italiccorrection:D
821     { \xeCJK_make_node:n { normalspace } }
822   }
823   {
824     \token_if_space:NTF \l_peek_token
825     { \xeCJK_make_space_node: }

```

```

826         {{{ \xeCJK_make_node:n { normalspace } }
827     }
828 }

829 \xeCJK_inter_class_toks:nnn { Boundary } { CJK }
830 {
831     \xeCJK_check_for_glue:
832     \xeCJK_class_group_begin:
833     \xeCJK_clear_Boundary_and_CJK_toks:
834     \xeCJK_select_font:
835     \xeCJK_fallback_symbol:NN
836     \CJKsymbol
837 }

\xeCJK_check_for_glue: 838 \cs_new_protected:Npn \xeCJK_check_for_glue:
839 {
840     \xeCJK_if_last_kern:TF
841     { \xeCJK_check_for_glue_auxi: }
842     {
843         \xeCJK_if_last_math:TF
844         { \xeCJK_remove_node: \CJKecglue }
845         { \xeCJK_check_for_glue_auxii: }
846     }
847 }
848 \cs_new_protected:Npn \xeCJK_check_for_glue_auxi:
849 {
850     \dim_case:nn { \tex_lastkern:D }
851     {
852         { \xeCJK_node:n { CJK } }
853         { \xeCJK_remove_node: \CJKglue }
854         { \xeCJK_node:n { CJK-space } }
855         { \xeCJK_remove_node: \xeCJK_ccglue_or_space: }
856         { \xeCJK_node:n { CJK-widow } }
857         { \xeCJK_remove_node: \xeCJK_widow_penalty: \CJKglue }
858         { \xeCJK_node:n { default } }
859         { \xeCJK_remove_node: \CJKecglue }
860     }
861 }
862 \cs_new_protected:Npn \xeCJK_check_for_glue_auxii:
863 {
864     \xeCJK_if_last_punct:TF
865     { \xeCJK_check_for_glue_auxiii: }
866     { \xeCJK_check_for_xglue: }
867 }
868 \cs_new_protected:Npn \xeCJK_check_for_glue_auxiii:
869 {
870     \bool_if:NT \l_xeCJK_last_penalty_bool
871     { \tex_penalty:D \l_xeCJK_last_penalty_int }
872     \skip_horizontal:N \l_xeCJK_last_skip
873     \tl_if_eq:NNF \l_xeCJK_align_tl \c_xeCJK_left_tl { \CJKglue }
874 }
875 \cs_new_eq:NN \xeCJK_check_for_xglue: \prg_do_nothing:
876 \cs_new_protected:Npn \xeCJK_check_for_xglue:
877 {
878     \xeCJK_if_last_glue:TF
879     {
880         \skip_set_eq:NN \l_xeCJK_last_skip \tex_lastskip:D
881         \tex_unskip:D
882         \xeCJK_if_last_node:nTF { CJK-space }
883         { \xeCJK_remove_node: \xeCJK_ccglue_or_space: }
884         {
885             \xeCJK_if_last_node:nTF { default-space }
886             { \xeCJK_remove_node: \CJKecglue }
887             { \xeCJK_check_for_xglue_aux: }
888         }
889     }
890 }
891 \cs_new_protected:Npn \xeCJK_check_for_xglue_aux:

```

```

892 {
893   \skip_if_eq:nnTF
894     { \l xeCJK_last_skip }
895     { \c_xeCJK_space_skip_tl }
896     {
897       \xeCJK_if_last_node:nTF { CJK }
898         { \xeCJK_remove_node: \xeCJK_ccglue_or_space: }
899         {
900           \xeCJK_if_last_node:nTF { default }
901             { \xeCJK_remove_node: \CJKeckglue }
902             {
903               \xeCJK_if_last_math:TF
904                 { \CJKeckglue }
905                 { \skip_horizontal:N \l xeCJK_last_skip }
906             }
907         }
908     }
909     { \skip_horizontal:N \l xeCJK_last_skip }
910 }
911 \cs_new_protected:Npn \xeCJK_ccglue_or_space:
912   { \CJKglue }

```

`\xeCJK_if_last_none:TF` Some ϵ -TEX node determination functions.

```

\group_begin:
\cs_set:Npn \xeCJK_tmp:nn #1
  {
  \exp_args:Ncc \xeCJK_tmp_aux:NNn
    { xeCJK_if_last_#1 : }
    { c xeCJK_#1_node }
  }
\cs_set:Npn \xeCJK_tmp_aux:NNNn #1#2#3
  {
  \int_const:Nn #2 {#3}
  \prg_new_conditional:Npnn #1 { T , F , TF }
  {
  \if_int_compare:w \tex_lastnodetype:D = #2
    \prg_return_true: \else: \prg_return_false: \fi:
  }
  }
\xeCJK_tmp:nn { none }      { -1 }
\xeCJK_tmp:nn { hlist }    { 1 }
\xeCJK_tmp:nn { math }     { 10 }
\xeCJK_tmp:nn { glue }     { 11 }
\xeCJK_tmp:nn { kern }     { 12 }
\xeCJK_tmp:nn { penalty }  { 13 }
\group_end:

\prg_new_conditional:Npnn \xeCJK_if_last_node:n #1 { p , T , F , TF }
  {
  \if_dim:w
    \cs_if_exist_use:cTF { c xeCJK_#1_node_dim }
      { = \tex_lastkern:D }
      { \use:c { c xeCJK_#1_node_skip } = \tex_lastskip:D }
    \prg_return_true: \else: \prg_return_false: \fi:
  }

```

`\xeCJK_declare_node:n` is used to determine the various kern and glue inserted.

```

\cs_new_protected:Npn \xeCJK_declare_node:n #1
  {
  \int_gincr:N \g xeCJK_node_int
  \dim_if_exist:cTF { c xeCJK_#1_node_dim }
    { \dim_gset:cn } { \dim_const:cn }
    { c xeCJK_#1_node_dim } { \g xeCJK_node_int sp }
  }
\cs_new_protected:Npn \xeCJK_declare_glue_node:n #1

```

```

952 {
953   \int_gincr:N \g xeCJK_node_int
954   \skip_if_exist:cTF { c xeCJK_#1_node_skip }
955   { \skip_gset:cn } { \skip_const:cn }
956   { c xeCJK_#1_node_skip } { \g xeCJK_node_int sp }
957 }
958 \int_new:N \g xeCJK_node_int
959 \int_gset:Nn \g xeCJK_node_int { 10 }
960 \cs_new_protected:Npn \xeCJK_make_node:n #1
961   { \exp_args:Nc \xeCJK_make_node:N { c xeCJK_#1_node_dim } }
962 \cs_new:Npn \xeCJK_node:n #1
963   { \use:c { c xeCJK_#1_node_dim } }
964 \cs_new:Npn \xeCJK_gule_node:n #1
965   { \use:c { c xeCJK_#1_node_skip } }
966 \cs_new_protected:Npn \xeCJK_make_node:N #1
967   {
968     \tex_kern:D - #1
969     \tex_kern:D #1
970   }
971 \cs_new_protected:Npn \xeCJK_remove_node:
972   {
973     \xeCJK_if_last_kern:TF
974     { \tex_unkern:D \tex_unkern:D }
975     {
976       \xeCJK_if_last_glue:T
977       { \tex_unskip:D \tex_unskip:D }
978     }
979   }
980 \xeCJK_declare_node:n { CJK }
981 \xeCJK_declare_node:n { CJK-space }
982 \xeCJK_declare_node:n { default }
983 \xeCJK_declare_node:n { CJK-widow }
984 \xeCJK_declare_node:n { normalspace }
985 \xeCJK_declare_glue_node:n { default-space }

```

`\xeCJK_make_space_node:` Used to judge the node before inserting space, default is null, only meaningful if user set `xCJKecglue` option. You need to use `glue` to mark it using `kern` will affect the character protrusion function.

```

986 \cs_new_eq:NN \xeCJK_make_space_node: \prg_do_nothing:
987 \cs_new_protected:Npx \xeCJK_make_space_node:
988   {
989     \tex_hskip:D - \xeCJK_gule_node:n { default-space }
990     \tex_hskip:D \xeCJK_gule_node:n { default-space }
991   }

```

CJKglue The glue inserted between CJK text.

```

992 \keys_define:nn { xeCJK / options }
993   {
994     CJKglue .code:n =
995     {
996       \cs_set_protected:Npn \CJKglue {#1}
997       \xeCJK_glue_to_skip:nN {#1} \l xeCJK_ccglue_skip
998     }
999   }
1000 \skip_new:N \l xeCJK_ccglue_skip

```

CJKecglue CJK with the space automatically added between the mathematical formulae in Western and mathematical lines.

xCJKecglue

```

1001 \keys_define:nn { xeCJK / options }
1002   {
1003     CJKecglue .code:n =
1004     {
1005       \cs_set_protected:Npn \CJKecglue {#1}
1006       \xeCJK_glue_to_skip:nN {#1} \l xeCJK_ecglue_skip
1007     } ,

```

```

1008   xCJKecglue .choice: ,
1009   xCJKecglue / true .code:n =
1010   {
1011     \bool_set_true:N \l xeCJK_xecglue_bool
1012     \cs_set_eq:NN \xeCJK_space_or_xecglue: \CJKecglue
1013     \cs_set_eq:NN \xeCJK_make_space_node: \xeCJK_make_space_node: 1014
1014     \cs_set_eq:NN \xeCJK_check_for_xglue: \xeCJK_check_for_xglue: 1015
1015     \cs_set_eq:NN \xeCJK_check_for_ecglue: \xeCJK_check_for_xecglue: 1016
1016     \cs_set_eq:NN
1017     \xeCJK_check_for_ecglue_normalsp:
1018     \xeCJK_check_for_xecglue_normalsp:
1019   } ,
1020   xCJKecglue / false .code:n =
1021   {
1022     \bool_set_false:N \l xeCJK_xecglue_bool
1023     \cs_set_eq:NN \xeCJK_space_or_xecglue: \xeCJK_space_glue:
1024     \xeCJK_cs_clear:N \xeCJK_make_space_node:
1025     \xeCJK_cs_clear:N \xeCJK_check_for_xglue:
1026     \cs_set_eq:NN \xeCJK_check_for_xecglue: \xeCJK_check_for_ecglue:
1027     \cs_set_eq:NN
1028     \xeCJK_check_for_ecglue_normalsp:
1029     \xeCJK_check_for_xecglue_normalsp:
1030   } ,
1031   xCJKecglue / unknown .code:n =
1032   {
1033     \bool_set_true:N \l xeCJK_xecglue_bool
1034     \cs_set_protected:Npn \CJKecglue {#1}
1035     \xeCJK_glue_to_skip:nN {#1} \l xeCJK_ecglue_skip
1036     \cs_set_eq:NN \xeCJK_space_or_xecglue: \CJKecglue
1037     \cs_set_eq:NN \xeCJK_make_space_node: \xeCJK_make_space_node: 1038
1038     \cs_set_eq:NN \xeCJK_check_for_xglue: \xeCJK_check_for_xglue: 1039
1039     \cs_set_eq:NN \xeCJK_check_for_ecglue: \xeCJK_check_for_xecglue: 1040
1040     \cs_set_eq:NN
1041     \xeCJK_check_for_ecglue_normalsp:
1042     \xeCJK_check_for_xecglue_normalsp:
1043   } ,
1044   xCJKecglue .default:n = { true }
1045 }
1046 \cs_new_eq:NN \xeCJK_space_glue: \c_space_tl
1047 \skip_new:N \l xeCJK_ecglue_skip
1048 \bool_new:N \l xeCJK_xecglue_bool

```

CJKspace Whether or not to keep the **space** between CJK text, default is not to keep it.

```

1049 \keys_define:nn { xeCJK / options }
1050 {
1051   CJKspace .choice: ,
1052   CJKspace / true .code:n =
1053   {
1054     \bool_set_true:N \l xeCJK_reserve_space_bool
1055     \cs_set_protected:Npn \xeCJK_ccglue_or_space:
1056     { \xeCJK_space_glue: }
1057   } ,
1058   CJKspace / false .code:n =
1059   {
1060     \bool_set_false:N \l xeCJK_reserve_space_bool
1061     \cs_set_protected:Npn \xeCJK_ccglue_or_space:
1062     { \CJKglue }
1063   } ,
1064   CJKspace .default:n = { true } ,
1065   space .meta:n = { CJKspace = true } , 1066
1066   nospace .meta:n = { CJKspace = false } 1067
1067 }
1068 \bool_new:N \l xeCJK_reserve_space_bool
1069 \xeCJK_inter_class_toks:nnn { CJK } { Boundary } { \xeCJK_CJK_and_Boundary:w }

```

`\xeCJK_CJK_and_Boundary:w` When the boundary is `\relax`, it may be generated by `\csname ... \endcsname`, which may cause problems¹⁴. Originally, they were all prefixed with `\exp_not:N` before the undefined control sequence, but now they are manually restored by using the end of grouping.

```

1070 \cs_new_protected:Npn \xeCJK_CJK_and_Boundary:w
1071 {
1072   \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
1073   {
1074     \bool_if:NTF \l_xeCJK_peek_ignore_spaces_bool
1075     { \xeCJK_class_group_end: \xeCJK_space_or_xecglue: }
1076     { \xeCJK_class_group_end: \CJKecglue }
1077   }
1078   {
1079     \group_align_safe_begin:
1080     \bool_if:NTF \l_xeCJK_peek_ignore_spaces_bool
1081     {
1082       \token_if_macro:NTF \l_peek_token
1083       { \xeCJK_boundary_reserve_space: }
1084       { \xeCJK_boundary_group_end:n { CJK-space } }
1085     }
1086     {
1087       \token_if_eq_meaning:NNTF \l_peek_token \scan_stop:
1088       { \xeCJK_CJK_and_Boundary_relax:N }
1089       { \xeCJK_boundary_group_end:n { CJK } }
1090     }
1091   }
1092 }
1093 \cs_new_protected:Npn \xeCJK_boundary_reserve_space:
1094 {
1095   \xeCJK_boundary_group_end:n { CJK-space }
1096   \xeCJK_space_or_xecglue:
1097 }
1098 \cs_new_protected:Npn \xeCJK_CJK_and_Boundary_relax:N #1
1099 {
1100   \xeCJK_boundary_group_end:n { CJK }
1101   \token_if_eq_meaning:NNTF #1 \scan_stop:
1102   { #1 } { \cs_set_eq:NN #1 \scan_stop: #1 }
1103 }
1104 \cs_new_protected:Npn \xeCJK_boundary_group_end:n #1
1105 {
1106   \group_align_safe_end:
1107   \xeCJK_class_group_end:
1108   { \xeCJK_make_node:n { #1 } }
1109 }
\xeCJK_ignore_spaces:w 1110 \cs_new_protected:Npn \xeCJK_ignore_spaces:w
1111 {
1112   \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
1113   {
1114     \bool_if:NTF \l_xeCJK_peek_ignore_spaces_bool
1115     { \xeCJK_space_or_xecglue: } { \CJKecglue }
1116   }
1117   {
1118     \bool_if:NT \l_xeCJK_peek_ignore_spaces_bool
1119     {
1120       \dim_case:nn { \tex_lastkern:D }
1121       {
1122         { \xeCJK_node:n { CJK } }
1123         { \xeCJK_remove_node: \xeCJK_make_node:n { CJK-space } }
1124         { \xeCJK_node:n { default } }
1125         { \xeCJK_remove_node: \xeCJK_make_space_node: }
1126       }
1127     }
1128     \group_align_safe_begin:
1129     \token_if_macro:NTF \l_peek_token
1130     { \xeCJK_reserve_space_aux: }

```

¹⁴ See <http://bbs.ctex.org/forum.php?mod=viewthread&tid=71563>.


```

1130         { \group_align_safe_end: }
1131     }
1132 }
1133 }
1134 \cs_new_protected:Npn \xeCJK_reserve_space_aux:
1135 {
1136     \group_align_safe_end:
1137     \xeCJK_space_or_xecglue:
1138 }

1139 \xeCJK_inter_class_toks:nnn { CJK } { CJK }
1140 { \xeCJK_CJK_and_CJK:N }

\xeCJK_CJK_and_CJK:N 1141 \cs_new_protected:Npn \xeCJK_CJK_and_CJK:N
1142 {
1143     \CJKglue
1144     \xeCJK_fallback_symbol:NN
1145     \CJKsymbol
1146 }

1147 \xeCJK_inter_class_toks:nnn { FullLeft } { CJK }
1148 {
1149     \xeCJK_FullLeft_and_CJK:
1150     \xeCJK_fallback_symbol:NN
1151     \CJKsymbol
1152 }
1153 \xeCJK_inter_class_toks:nnn { FullRight } { CJK }
1154 {
1155     \xeCJK_FullRight_and_CJK:
1156     \xeCJK_fallback_symbol:NN
1157     \CJKsymbol
1158 }
1159 \seq_map_inline:Nn \g xeCJK_non_CJK_class_seq
1160 {
1161     \clist_map_inline:nn { FullLeft , FullRight }
1162     {
1163         \xeCJK_inter_class_toks:nne {#1} {##1}
1164         { \exp_not:c { xeCJK_Default_and_##1:nN } {#1} }
1165         \xeCJK_inter_class_toks:nne {##1} {#1}
1166         { \exp_not:c { xeCJK_##1_and_Default: } }
1167     }
1168 }

1169 \xeCJK_inter_class_toks:nnn { Boundary } { FullLeft }
1170 { \xeCJK_Boundary_and_FullLeft:N }
1171 \xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
1172 { \xeCJK_Boundary_and_FullRight:N }

1173 \xeCJK_inter_class_toks:nnn { FullLeft } { Boundary }
1174 { \xeCJK_FullLeft_and_Boundary: }
1175 \xeCJK_inter_class_toks:nnn { FullRight } { Boundary }
1176 { \xeCJK_FullRight_and_Boundary: }

\xeCJK_FullLeft_and_Boundary: 1177 \cs_new_protected:Npn \xeCJK_FullLeft_and_Boundary:
1178 {
1179     \xeCJK_punct_if_middle:NTF \g xeCJK_last_punct_tl
1180     {
1181         \xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
1182         \xeCJK_class_group_end:
1183         \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
1184         \xeCJK_no_break:
1185         \xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
1186     }
1187     {
1188         \xeCJK_class_group_end:
1189         \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
1190         \xeCJK_nobreak_zero_glue:
1191     }
1192     \tex_ignorespaces:D
1193 }

```

```

\XeCJK_FullRight_and_Boundary: 1194 \cs_new_protected:Npn \XeCJK_FullRight_and_Boundary:
1195 {
1196   \XeCJK_punct_rule:NN \c XeCJK_right_tl \g XeCJK_last_punct_tl
1197   \XeCJK_class_group_end:
1198   \exp_after:wN \XeCJK_punct_node:N \g XeCJK_last_punct_tl
1199   \XeCJK_punct_glue:NN \c XeCJK_right_tl \g XeCJK_last_punct_tl
1200   \tex_ignorespaces:D
1201 }

```

`\XeCJK_punct_node:N` saves the current border width and character code of the punctuation, which is realized by inserting `\kern`.

```

1202 \cs_new_protected:Npn \XeCJK_punct_node:N #1
1203 {
1204   \XeCJK_punct_bound_unitization:NN #1 \l XeCJK_tmp_dim
1205   \XeCJK_make_node:N \l XeCJK_tmp_dim
1206   \dim_set:Nn \l XeCJK_tmp_dim {`#1 sp}
1207   \XeCJK_make_node:N \l XeCJK_tmp_dim
1208 }

```

`_XeCJK_punct_bound_unitization:NN` We do not want to have too large `\kern`, so when the boundary is larger than 1pt, `\c_max_dim` is used as the standard for "unitization".

```

1209 \cs_new_protected:Npn \XeCJK_punct_bound_unitization:NN #1#2
1210 {
1211   \dim_set:Nn #2
1212   {
1213     \dim_max:nn
1214     { \c_zero_dim }
1215     { \XeCJK_use_punct_dim:nNN { bound } \c XeCJK_right_tl #1 }
1216   }
1217   \dim_compare:nNnF {#2} < { 1pt }
1218   { \dim_set:Nn #2 { -1pt * \dim_ratio:nn {#2} { \c_max_dim } }
1219 }

```

```

\XeCJK_punct_bound_kern:N 1220 \cs_new_protected:Npn \XeCJK_punct_bound_kern:N #1
\XeCJK_punct_bound_kern:NN 1221 {
1222   \exp_after:wN \XeCJK_punct_bound_kern:NN
1223   \g XeCJK_last_punct_tl #1
1224 }
1225 \cs_new_protected:Npn \XeCJK_punct_bound_kern:NN #1#2
1226 {
1227   \XeCJK_get_punct_bounds:NN \l XeCJK_align_tl #1
1228   \XeCJK_get_punct_kerning:NN #1 #2
1229   \XeCJK_punct_bound_unitization:NN #1 \l XeCJK_tmp_dim
1230   \skip_set:Nn \l XeCJK_punct_kern_skip
1231   { \XeCJK_use_dim_or_skip:nNN { bound_kern } #1 #2 }
1232   \dim_compare:nNnF \l XeCJK_tmp_dim = \l XeCJK_last_bound_dim
1233   { \XeCJK_punct_bound_kern_ratio:NN #1 #2 }
1234   \bool_if:NTF \l XeCJK_last_penalty_bool
1235   {
1236     \tex_penalty:D \l XeCJK_last_penalty_int
1237     \skip_horizontal:N
1238   }
1239   { \XeCJK_punct_bound_kern_aux:NNN #1 #2 }
1240   \l XeCJK_punct_kern_skip
1241 }
1242 \skip_new:N \l XeCJK_punct_kern_skip

```

`_XeCJK_punct_bound_kern_ratio:NN` Compress by a certain ratio when the font situation before and after the punctuation is not consistent.

```

1243 \cs_new_protected:Npn \XeCJK_punct_bound_kern_ratio:NN #1#2
1244 {
1245   \dim_set:Nn \l XeCJK_bound_dim
1246   { \XeCJK_use_punct_dim:nNN { bound_width } #1 #2 }
1247   \dim_compare:nNnT \l XeCJK_bound_dim > \c_zero_dim 1248
1248   {
1249     \dim_compare:nNnF \l XeCJK_last_bound_dim > \c_zero_dim
1250     {

```

```

1251         \dim_set:Nn \l xeCJK_last_bound_dim
1252         {
1253             - \l xeCJK_last_bound_dim *
1254             \dim_ratio:nn { \c_max_dim } { 1pt }
1255         }
1256     }
1257     \xeCJK_punct_bound_kern_ratio_aux:N #2
1258 }
1259 }
1260 \cs_new_protected:Npn \xeCJK_punct_bound_kern_ratio_aux:N #1
1261 {
1262     \skip_set:Nn \l xeCJK_punct_kern_skip
1263     {
1264         \l xeCJK_punct_kern_skip *
1265         \dim_ratio:nn
1266         {
1267             \l xeCJK_last_bound_dim
1268             + \xeCJK_use_punct_dim:nNN { bound } \c xeCJK_left_tl #1
1269         }
1270         { \l xeCJK_bound_dim }
1271     }
1272 }

```

```

\ xeCJK_nobreak_hskip:N 1273 \cs_new_protected:Npn \xeCJK_nobreak_hskip:N
\ xeCJK_nobreak_hskip:n 1274 { \xeCJK_no_break: \skip_horizontal:N }
\ xeCJK_punct_bound_kern:N 1275 \cs_new_protected:Npn \xeCJK_nobreak_hskip:n
\ xeCJK_punct_bound_breakable_kern:N 1276 { \xeCJK_no_break: \skip_horizontal:n }
1277 \cs_new_eq:NN \xeCJK_punct_bound_kern:N \xeCJK_nobreak_hskip:N
1278 \cs_new_protected:Npn \xeCJK_punct_bound_breakable_kern:N
1279 {
1280     \tl_if_eq:NNTF \l xeCJK_aligni_tl \c xeCJK_right_tl
1281     {
1282         \tl_if_eq:NNTF \l xeCJK_alignii_tl \c xeCJK_left_tl
1283         { \skip_horizontal:N }
1284         { \xeCJK_nobreak_hskip:N }
1285     }
1286     { \xeCJK_nobreak_hskip:N }
1287 }
1288 \cs_new_protected:Npn \xeCJK_punct_bound_kern_aux:NNN #1#2
1289 {
1290     \str_if_eq:nnTF {#1} {#2}
1291     { \xeCJK_nobreak_hskip:N }
1292     {
1293         \xeCJK_punct_if_long:NTF #1
1294         { \skip_horizontal:N }
1295         {
1296             \xeCJK_punct_if_long:NTF #2
1297             { \skip_horizontal:N }
1298             { \xeCJK_punct_bound_kern:N }
1299         }
1300     }
1301 }
1302 \clist_map_inline:nn { CJK , FullLeft , FullRight }
1303 {
1304     \clist_map_inline:nn { FullLeft , FullRight }
1305     {
1306         \xeCJK_inter_class_toks:nne {#1} {##1}
1307         { \exp_not:c { xeCJK_#1_and_##1:N } }
1308     }
1309 }

```

`\xeCJK_punct_bound_rule:NN` is used to erase all left/right margins of punctuation marks.

```

1310 \cs_new_protected:Npn \xeCJK_punct_bound_rule:NN #1#2
1311 {
1312     \tex_vrule:D
1313     width - \xeCJK_use_punct_dim:nNN { bound } #1 #2 ~

```

```

1314     depth \c_zero_dim
1315     height \c_zero_dim \scan_stop:
1316   }

```

`\xeCJK_punct_rule:NN` is used to reduce the left/right margin of punctuation marks.

```

1317 \cs_new_protected:Npn \xeCJK_punct_rule:NN #1#2
1318   {
1319     \tex_vrule:D
1320     width \xeCJK_use_punct_dim:nNN { rule } #1 #2 ~
1321     depth \c_zero_dim
1322     height \c_zero_dim \scan_stop:
1323   }

```

`\xeCJK_punct_glue:NN` Blank space added to the left/right of the punctuation mark according to the selected punctuation treatment.

```

1324 \cs_new_protected:Npn \xeCJK_punct_glue:NN #1#2
1325   { \xeCJK_punct_hskip:n { \xeCJK_use_dim_or_skip:nNN { glue } #1 #2 } }
1326 \cs_new_eq:NN \xeCJK_punct_hskip:n \skip_horizontal:n

```

`\xeCJK_punct_kern:NN` The spacing between two adjacent punctuation points, always allow the long punctuation point to be folded between other punctuation points.

```

\xeCJK_punct_kern:NN
1327 \cs_new_protected:Npn \xeCJK_punct_kern:NN #1#2
1328   {
1329     \str_if_eq:eeTF {#1} {#2}
1330     { \xeCJK_punct_nobreak_kern:NN }
1331     {
1332       \xeCJK_punct_if_long:NTF #1
1333       { \xeCJK_punct_breakable_kern:NN }
1334       {
1335         \xeCJK_punct_if_long:NTF #2
1336         { \xeCJK_punct_breakable_kern:NN }
1337         { \xeCJK_punct_nobreak_kern:NN }
1338       }
1339     }
1340     #1 #2
1341   }
1342 \cs_new_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_kern:NN

```

```

\xeCJK_punct_nobreak_kern:NN
1343 \cs_new_protected:Npn \xeCJK_punct_nobreak_kern:NN #1#2
1344   { \xeCJK_nobreak_hskip:n { \xeCJK_use_dim_or_skip:nNN { kern } #1 #2 } }

```

```

\xeCJK_punct_breakable_kern:NN
1345 \cs_new_protected:Npn \xeCJK_punct_breakable_kern:NN #1#2
1346   {
1347     \exp_after:wN \xeCJK_punct_if_right:NT #1
1348     { \xeCJK_punct_rule:NN \c xeCJK_right_tl #1 }
1349     \xeCJK_punct_breakable_kern:n
1350     { \xeCJK_use_dim_or_skip:nNN { bound_kern } #1 #2 }
1351     \xeCJK_punct_if_right:NF #2
1352     { \xeCJK_punct_rule:NN \c xeCJK_left_tl #2 }
1353   }
1354 \cs_new_eq:NN \xeCJK_punct_breakable_kern:n \skip_horizontal:n

```

`\gxeCJK_last_punct_tl` is used to record the current punctuation mark.

```

1355 \tl_new:N \gxeCJK_last_punct_tl

```

```

\xeCJK_FullLeft_and_CJK:
1356 \cs_new_protected:Npn \xeCJK_FullLeft_and_CJK:
1357   {
1358     \xeCJK_punct_if_middle:NTF \gxeCJK_last_punct_tl
1359     {
1360       \xeCJK_punct_rule:NN \c xeCJK_right_tl \gxeCJK_last_punct_tl
1361       \xeCJK_no_break:
1362       \xeCJK_punct_glue:NN \c xeCJK_left_tl \gxeCJK_last_punct_tl
1363     }
1364     {}
1365     \xeCJK_select_font:
1366   }

```

`\xeCJK_FullLeft_and_Default`: `\xeCJK_nobreak_zero_glue`: Used to make sure the western words after `FullLeft` class can be broken.

```

1367 \cs_new_protected:Npn \xeCJK_FullLeft_and_Default:
1368   {
1369     \xeCJK_punct_if_middle:NTF \g xeCJK_last_punct_tl
1370     {
1371       \xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
1372       \xeCJK_class_group_end: \xeCJK_no_break:
1373       \xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
1374     }
1375     {
1376       \xeCJK_class_group_end:
1377       \xeCJK_nobreak_zero_glue:
1378     }
1379   }
1380 \cs_new_protected:Npn \xeCJK_nobreak_zero_glue:
1381   {
1382     \tex_penalty:D \c xeCJK_nobreak_penalty_int
1383     \skip_horizontal:N \c_zero_skip
1384   }
1385 \cs_new_protected:Npn \xeCJK_zero_glue:
1386   { \skip_horizontal:N \c_zero_skip }

```

```

\xeCJK_FullRight_and_CJK: 1387 \cs_new_protected:Npn \xeCJK_FullRight_and_CJK:
1388 {
1389   \xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl 1390
1390   \xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl 1391 \
1391   \xeCJK_select_font:
1392     \CJKglue
1393 }

```

```

\xeCJK_FullRight_and_Default: 1394 \cs_new_protected:Npn \xeCJK_FullRight_and_Default:
1395   {
1396     \xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
1397     \xeCJK_class_group_end:
1398     \xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
1399   }

```

```

\xeCJK_Default_and_FullLeft:nN 1400 \cs_new_protected:Npn \xeCJK_Default_and_FullLeft:nN #1#2
1401   {
1402     \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #2
1403     \xeCJK_Default_and_FullLeft_glue:N #2
1404     \xeCJK_class_group_begin:
1405     \xeCJK_select_punct_font:
1406     \xeCJK_clear_inter_class_toks:nn {#1} { FullLeft }
1407     \xeCJK_clear_Boundary_and_CJK_toks:
1408     \tl_gset:Nn \g xeCJK_last_punct_tl {#2}
1409     \xeCJK_punct_rule:NN \c xeCJK_left_tl #2
1410     \xeCJK_fallback_punct_symbol:NN
1411     \CJKpunctsymbol #2
1412   }
1413 \cs_new_protected:Npn \xeCJK_Default_and_FullLeft_glue:N #1
1414   { \xeCJK_punct_glue:NN \c xeCJK_left_tl #1 }

```

```

\xeCJK_CJK_and_FullLeft:N 1415 \cs_new_protected:Npn \xeCJK_CJK_and_FullLeft:N #1
1416   {
1417     \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #1
1418     \xeCJK_CJK_and_FullLeft_glue:N #1
1419     \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
1420     \xeCJK_punct_rule:NN \c xeCJK_left_tl #1
1421     \xeCJK_select_punct_font:
1422     \xeCJK_fallback_punct_symbol:NN
1423     \CJKpunctsymbol #1
1424   }
1425 \cs_new_protected:Npn \xeCJK_CJK_and_FullLeft_glue:N #1
1426   {
1427     \CJKglue
1428     \xeCJK_punct_glue:NN \c xeCJK_left_tl #1
1429   }

```

```

\XeCJK_Boundary_and_FullLeft:N 1430 \cs_new_protected:Npn \XeCJK_Boundary_and_FullLeft:N #1
1431 {
1432   \XeCJK_get_punct_bounds:NN \c XeCJK_left_tl #1
1433   \XeCJK_Boundary_and_FullLeft_glue:N #1
1434   \XeCJK_class_group_begin:
1435   \XeCJK_select_punct_font:
1436   \XeCJK_clear_Boundary_and_CJK_toks:
1437   \tl_gset:Nn \g XeCJK_last_punct_tl {#1}
1438   \XeCJK_punct_rule:NN \c XeCJK_left_tl #1
1439   \XeCJK_fallback_punct_symbol:NN
1440   \CJKpunctsymbol #1
1441 }

```

`\XeCJK_Boundary_and_FullLeft_glue:N` according to the value of `\etex_lastnodetype:D` for separate processing.

```

1442 \cs_new_protected:Npn \XeCJK_Boundary_and_FullLeft_glue:N #1
1443 {
1444   \tl_set_eq:NN \l XeCJK_alignii_tl \c XeCJK_left_tl
1445   \group_begin: \exp_args:NNc \group_end: \cs_if_exist_use:NTF
1446     { XeCJK_bound_type_ _int_use:N \etex_lastnodetype:D _glue:Nn }
1447     {#1}
1448     { \use:n }
1449     { \XeCJK_punct_glue:NN \c XeCJK_left_tl #1 }
1450 }
1451 \tl_new:N \c XeCJK_alignii_tl

```

`\XeCJK_bound_type_-1_glue:Nn \etex_lastnodetype:D` for `-1` means empty list, which often appears at the beginning of the box and is used before the paragraph

`\noindent` is this case.

```

1452 \cs_new_protected:cpn { XeCJK_bound_type_-1_glue:Nn } #1#2
1453 { \XeCJK_zero_glue: }

```

`\XeCJK_bound_type_1_glue:Nn 1` means `hlist` node, which is used here to determine whether it is located at the beginning of the paragraph. Based on the normal case, TEX will insert a horizontal box with `\parindentwidth` at the beginning of the paragraph for indentation.

```

1454 \cs_new_protected:cpn { XeCJK_bound_type_1_glue:Nn } #1
1455 {
1456   \int_do_while:nNnn \etex_lastnodetype:D = \c XeCJK_hlist_node
1457     { \XeCJK_bound_hbox_auxi: }
1458   \XeCJK_if_last_none:TF
1459     {
1460       \dim_case:nnF { \box_wd:N \l XeCJK_indent_box }
1461       {
1462         { \etex_parindent:D } { \XeCJK_bound_hbox_auxii:nn }
1463         { \c_zero_dim }      { \use_i:nn }
1464       }
1465       { \use:nn }
1466     }
1467     { \use:nn }
1468     { \hbox_unpack_drop:N \l XeCJK_indent_box }
1469   }
1470 \cs_new_protected:Npn \XeCJK_bound_hbox_auxi:
1471 {
1472   \box_set_to_last:N \l XeCJK_tmp_box
1473   \hbox_set:Nn \l XeCJK_indent_box
1474   {
1475     \box_use:N \l XeCJK_tmp_box
1476     \hbox_unpack:N \l XeCJK_indent_box
1477   }
1478 }
1479 \cs_new_protected:Npn \XeCJK_bound_hbox_auxii:nn
1480 {
1481   \dim_compare:nNnTF
1482     { \box_ht:N \l XeCJK_tmp_box } = \c_zero_dim
1483     { \use_i:nn }
1484     { \use:nn }
1485 }
1486 \box_new:N \l XeCJK_indent_box

```

`\xeCJK_bound_type_11_glue:Nn 11` means **glue node**, and the purpose of this judgment is to align to the cell boundary when the full-corner left scale point appears at the beginning of the **non-p** column of the LATEX table. The judgment is based on the standard LATEX table column format (`\@tabclassz`) definition with `\hskip1sp` in front of columns **l** and **r** to prevent `\tabcolsep` from being unintentionally `\unskip`, and `\hfil` in front of column **c**. The `enumitem` macro package modifies the `\item` used in the `description` environment (`\enit@postlabel@i`), where the one that plays an influential role is `\penalty\z@ \hskip\labelsep`.

```

1487 \cs_new_protected:cpn { xeCJK_bound_type_ 11 _glue:Nn } #1#2
1488   {
1489     \skip_if_finite:nTF { \tex_lastskip:D } 1490
1490       { \xeCJK_bound_glue_auxi:Nn #1 {#2} }
1491       { \xeCJK_zero_glue: }
1492   }
1493 \cs_new_protected:Npn \xeCJK_bound_glue_auxi:Nn #1#2
1494   {
1495     \xeCJK_if_last_punct_glue:TF
1496       { \xeCJK_punct_bound_kern:N #1 }
1497       { \xeCJK_bound_glue_auxii:n {#2} }
1498   }
1499 \cs_new_protected:Npn \xeCJK_bound_glue_auxii:n #1
1500   {
1501     \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
1502     \skip_if_eq:NNTF { \l xeCJK_last_skip } { 1sp } 1503
1503     { \xeCJK_zero_glue: }
1504     {
1505       \skip_if_eq:nnTF { \l xeCJK_last_skip } { \labelsep }
1506       {
1507         \tex_unskip:D
1508         \xeCJK_if_last_penalty:TF
1509           {
1510             \int_compare:nNnTF \tex_lastpenalty:D = \c_zero_int
1511               { \skip_horizontal:N \l xeCJK_last_skip }
1512               { \skip_horizontal:N \l xeCJK_last_skip #1 }
1513           }
1514           { \skip_horizontal:N \l xeCJK_last_skip #1 }
1515         }
1516       }
1517     }
1518   }

```

`\xeCJK_bound_type_12_glue:Nn 12` means **kern node**, used to judge whether the previous character is CJK class, if yes, then insert `\CJKglue`.

```

1519 \cs_new_protected:cpn { xeCJK_bound_type_ 12 _glue:Nn } #1#2
1520   {
1521     \xeCJK_if_last_node:nF { CJK }
1522     { \xeCJK_if_last_node:nF { CJK-space } { \use_none:nn } }
1523     \xeCJK_remove_node: \CJKglue
1524     #2
1525   }

```

`\xeCJK_bound_type_13_glue:n 13` means **penalty node**, and the purpose of judgment here is to align to the boundary when the full-corner left scale point appears after `\item` in LATEX list environment. The judgment is based on the internal definition of `\item \@item to \everypar` modified, here to play a role in the impact of `\box \@labels \penalty\z@`. All the above judgments are rather rough, and no better way comes to mind for the time being.

```

1526 \cs_new_protected:cpn { xeCJK_bound_type_ 13 _glue:Nn } #1#2
1527   {
1528     \xeCJK_if_last_punct_penalty:TF
1529       { \xeCJK_punct_bound_kern:N #1 }
1530       {
1531         \int_compare:nNnTF \tex_lastpenalty:D = \c_zero_int
1532         {
1533           \tex_unpenalty:D
1534           \xeCJK_if_last_hlist:TF

```

```
1535     {\tex_penalty:D \c_zero_int }  
1536     {\tex_penalty:D \c_zero_int #2 }  
1537   }  
1538   {#2}
```



```

1539   }
1540 }

```

```

\XeCJK_Default_and_FullRight:nN 1541 \cs_new_protected:Npn \XeCJK_Default_and_FullRight:nN #1#2
1542 {
1543   \XeCJK_get_punct_bounds:NN \c xeCJK_right_tl #2
1544   \XeCJK_Default_and_FullRight_glue:N #2
1545   \XeCJK_class_group_begin:
1546   \XeCJK_select_punct_font:
1547   \XeCJK_clear_inter_class_toks:nn {#1} { FullRight }
1548   \XeCJK_clear_Boundary_and_CJK_toks:
1549   \tl_gset:Nn \g xeCJK_last_punct_tl {#2}
1550   \XeCJK_FullRight_symbol:N #2
1551 }

```

```

\XeCJK_Boundary_and_FullRight:N 1552 \cs_new_protected:Npn \XeCJK_Boundary_and_FullRight:N #1
1553 {
1554   \XeCJK_get_punct_bounds:NN \c xeCJK_right_tl #1
1555   \XeCJK_if_last_punct:TF
1556   {
1557     \tl_set_eq:NN \l xeCJK_alignii_tl \c xeCJK_right_tl
1558     \XeCJK_punct_bound_kern:N
1559   }
1560   { \XeCJK_Default_and_FullRight_glue:N }
1561   #1
1562   \XeCJK_class_group_begin:
1563   \XeCJK_select_punct_font:
1564   \XeCJK_clear_Boundary_and_CJK_toks:
1565   \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
1566   \XeCJK_FullRight_symbol:N #1
1567 }

```

```

\XeCJK_CJK_and_FullRight:N 1568 \cs_new_protected:Npn \XeCJK_CJK_and_FullRight:N #1
1569 {
1570   \XeCJK_get_punct_bounds:NN \c xeCJK_right_tl #1
1571   \XeCJK_CJK_and_FullRight_glue:N #1
1572   \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
1573   \XeCJK_select_punct_font:
1574   \XeCJK_FullRight_symbol:N #1
1575 }

```

`\XeCJK_if_last_punct:TF` Determine if it is a punctuation mark before.

```

1576 \cs_new_protected:Npn \XeCJK_if_last_punct:TF
1577 {
1578   \bool_set_false:N \l xeCJK_last_penalty_bool
1579   \XeCJK_if_last_glue:TF
1580   { \XeCJK_if_last_punct_glue:TF }
1581   {
1582     \XeCJK_if_last_penalty:TF
1583     { \XeCJK_if_last_punct_penalty:TF }
1584     { \use_ii:nn }
1585   }
1586 }
1587 \cs_new_protected:Npn \XeCJK_if_last_punct_glue:TF
1588 {
1589   \prop_get:NoNTF \g xeCJK_punct_skip_prop
1590   { \skip_use:N \tex_lastskip:D } \l xeCJK_tmp_tl
1591   { \XeCJK_if_last_punct_glue_auxi:TF }
1592   { \XeCJK_if_last_punct_glue_auxii:TF }
1593 }
1594 \cs_new_protected:Npn \XeCJK_if_last_punct_glue_auxi:TF
1595 {
1596   \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
1597   \tex_unskip:D
1598   \int_compare:nNnTF \tex_lastpenalty:D = \c xeCJK_nobreak_penalty_int
1599   { \XeCJK_if_last_punct_auxi:TF { \use_i:nn } }
1600   {

```

```

1601     \xeCJK_if_last_node:TF
1602     { \xeCJK_if_last_punct_auxii:TF { \use_i:nn } }
1603     { \use:n }
1604   }
1605   { \skip_horizontal:N \l xeCJK_last_skip \use_ii:nn }
1606 }
1607 \cs_new_protected:Npn \xeCJK_if_last_punct_glue_auxii:TF
1608 {
1609   \group_begin:
1610   \g xeCJK_space_factor_int \tex_spacefactor:D
1611   \skip_if_eq:nnTF { \tex_lastskip:D } { \c_xeCJK_space_skip_tl }
1612   { \group_end: \xeCJK_if_last_punct_glue_auxiii:TF }
1613   { \group_end: \use_ii:nn }
1614 }
1615 \cs_new_protected:Npn \xeCJK_if_last_punct_glue_auxiii:TF
1616 {
1617   \skip_set_eq:NN \l xeCJK_tmp_skip \tex_lastskip:D
1618   \tex_unskip:D
1619   \xeCJK_if_last_glue:TF
1620   {
1621     \prop_get:NoNTF \g xeCJK_punct_skip_prop
1622     { \skip_use:N \tex_lastskip:D } \l xeCJK_tmp_tl
1623     { \xeCJK_if_last_punct_glue_auxi:TF { \use_i:nn } }
1624     { \use:n }
1625   }
1626   { \use:n }
1627   { \skip_horizontal:N \l xeCJK_tmp_skip \use_ii:nn }
1628 }
1629 \cs_new_protected:Npn \xeCJK_if_last_punct_penalty:TF
1630 {
1631   \int_set_eq:NN \l xeCJK_last_penalty_int \tex_lastpenalty:D
1632   \tex_unpenalty:D
1633   \bool_set_true:N \l xeCJK_last_penalty_bool
1634   \xeCJK_if_last_glue:TF
1635   { \xeCJK_if_last_punct_glue:TF { \use_i:nn } }
1636   { \use:n }
1637   { \xeCJK_last_punct_penalty_false:nn }
1638 }
1639 \cs_new_protected:Npn \xeCJK_last_punct_penalty_false:nn #1#2
1640 {
1641   \bool_set_false:N \l xeCJK_last_penalty_bool
1642   \tex_penalty:D \l xeCJK_last_penalty_int
1643   #2
1644 }
1645 \cs_new_protected:Npn \xeCJK_if_last_punct_auxi:TF
1646 {
1647   \tex_unpenalty:D
1648   \bool_if:NF \l xeCJK_last_penalty_bool
1649   {
1650     \bool_set_true:N \l xeCJK_last_penalty_bool
1651     \int_set_eq:NN \l xeCJK_last_penalty_int \c xeCJK_nobreak_penalty_int
1652   }
1653   \xeCJK_if_last_node:TF
1654   { \xeCJK_if_last_punct_auxii:TF { \use_i:nn } }
1655   { \use:n }
1656   { \xeCJK_no_break: \use_ii:nn }
1657 }
1658 \cs_new_protected:Npn \xeCJK_if_last_punct_auxii:TF
1659 {
1660   \dim_compare:nNnTF \l xeCJK_last_kern_dim > \c_zero_dim
1661   { \xeCJK_if_last_punct_auxiii:TF }
1662   { \xeCJK_make_node:N \l xeCJK_last_kern_dim \use_ii:nn }
1663 }
1664 \cs_new_protected:Npn \xeCJK_if_last_punct_auxiii:TF
1665 {
1666   \int_case:nnTF { \tex_XeTeXcharclass:D \l xeCJK_last_kern_dim }
1667   {

```

```

1668     { \xeCJK_class_num:n { FullRight } }
1669     { \tl_set_eq:NN \l xeCJK_aligni_tl \c xeCJK_right_tl }
1670     { \xeCJK_class_num:n { FullLeft } }
1671     { \tl_set_eq:NN \l xeCJK_aligni_tl \c xeCJK_left_tl }
1672   }
1673   { \ xeCJK_if_last_punct_auxiv:TF }
1674   { \use_ii:nn }
1675 }
1676 \cs_new_protected:Npn \ xeCJK_if_last_punct_auxiv:TF
1677 {
1678   \dim_set_eq:NN \l xeCJK_tmp_dim \l xeCJK_last_kern_dim
1679   \xeCJK_if_last_node:TF
1680   {
1681     \tl_gset:Nx \g xeCJK_last_punct_tl
1682     { \tex_Uchar:D \l xeCJK_tmp_dim }
1683     \dim_set_eq:NN \l xeCJK_last_bound_dim \l xeCJK_last_kern_dim
1684     \use_i:nn
1685   }
1686   { \ xeCJK_make_node:N \l xeCJK_tmp_dim \use_ii:nn }
1687 }
1688 \tl_new:N \l xeCJK_aligni_tl
1689 \tl_new:N \l xeCJK_alignii_tl
1690 \int_new:N \l xeCJK_last_penalty_int
1691 \dim_new:N \l xeCJK_last_bound_dim
1692 \bool_new:N \l xeCJK_last_penalty_bool

```

```

\xeCJK_if_last_node:TF 1693 \cs_new_protected:Npn \xeCJK_if_last_node:TF #1#2
1694 {
1695   \ xeCJK_if_last_kern:TF
1696   {
1697     \dim_set_eq:NN \l xeCJK_last_kern_dim \tex_lastkern:D
1698     \tex_unkern:D
1699     \ xeCJK_if_last_kern:TF
1700     {
1701       \dim_compare:nNnTF \tex_lastkern:D = { - \l xeCJK_last_kern_dim }
1702       { \tex_unkern:D #1 }
1703       { \tex_kern:D \l xeCJK_last_kern_dim #2 }
1704     }
1705     { \tex_kern:D \l xeCJK_last_kern_dim #2 }
1706   }
1707   {#2}
1708 }
1709 \dim_new:N \l xeCJK_last_kern_dim

```

```

\xeCJK_CJK_and_FullRight_glue:N 1710 \cs_new_protected:Npn \ xeCJK_CJK_and_FullRight_glue:N #1
\xeCJK_Default_and_FullRight_glue:N 1711 {
1712   \ xeCJK_punct_if_long:NTF #1
1713   { \xeCJK_allow_break: }
1714   { \xeCJK_no_break: }
1715   \ xeCJK_punct_if_middle:NT #1
1716   {
1717     \CJKglue
1718     \ xeCJK_punct_glue:NN \c xeCJK_right_tl #1
1719     \ xeCJK_punct_rule:NN \c xeCJK_left_tl #1
1720   }
1721 }
1722 \cs_new_protected:Npn \ xeCJK_Default_and_FullRight_glue:N #1
1723 {
1724   \ xeCJK_punct_if_long:NTF #1
1725   { \xeCJK_allow_break: }
1726   { \xeCJK_no_break: }
1727   \ xeCJK_punct_if_middle:NT #1
1728   {
1729     \ xeCJK_punct_glue:NN \c xeCJK_right_tl #1
1730     \ xeCJK_punct_rule:NN \c xeCJK_left_tl #1
1731   }
1732 }

```

```

\XeCJK_FullLeft_and_FullLeft:N 1733 \cs_new_protected:Npn \XeCJK_FullLeft_and_FullLeft:N #1
1734 {
1735   \XeCJK_get_punct_bounds:NN \c XeCJK_left_tl #1
1736   \XeCJK_get_punct_kerning:oN \g XeCJK_last_punct_tl #1
1737   \XeCJK_punct_kern:NN \g XeCJK_last_punct_tl #1
1738   \tl_gset:Nn \g XeCJK_last_punct_tl {#1}
1739   \XeCJK_fallback_punct_symbol:NN
1740   \CJKpunctsymbol #1
1741 }

\XeCJK_FullLeft_and_FullRight:N 1742 \cs_new_protected:Npn \XeCJK_FullLeft_and_FullRight:N #1
1743 {
1744   \XeCJK_get_punct_bounds:NN \c XeCJK_right_tl #1
1745   \XeCJK_get_punct_kerning:oN \g XeCJK_last_punct_tl #1
1746   \XeCJK_punct_kern:NN \g XeCJK_last_punct_tl #1
1747   \tl_gset:Nn \g XeCJK_last_punct_tl {#1}
1748   \XeCJK_FullRight_symbol:N #1
1749 }

\XeCJK_FullRight_and_FullLeft:N 1750 \cs_new_protected:Npn \XeCJK_FullRight_and_FullLeft:N #1
1751 {
1752   \XeCJK_get_punct_bounds:NN \c XeCJK_left_tl #1
1753   \XeCJK_get_punct_kerning:oN \g XeCJK_last_punct_tl #1
1754   \XeCJK_punct_kern:NN \g XeCJK_last_punct_tl #1
1755   \tl_gset:Nn \g XeCJK_last_punct_tl {#1}
1756   \XeCJK_fallback_punct_symbol:NN
1757   \CJKpunctsymbol #1
1758 }

\XeCJK_FullRight_and_FullRight:N 1759 \cs_new_protected:Npn \XeCJK_FullRight_and_FullRight:N #1
1760 {
1761   \XeCJK_get_punct_bounds:NN \c XeCJK_right_tl #1
1762   \XeCJK_get_punct_kerning:oN \g XeCJK_last_punct_tl #1
1763   \XeCJK_punct_kern:NN \g XeCJK_last_punct_tl #1
1764   \tl_gset:Nn \g XeCJK_last_punct_tl {#1}
1765   \XeCJK_FullRight_symbol:N #1
1766 }

```

5.7 Line break after full-corner right punctuation

The `CheckFullRight` option is set.

```

1767 \keys_define:nn { XeCJK / options }
1768 {
1769   CheckFullRight .choice: ,
1770   CheckFullRight / true .code:n =
1771   {
1772     \cs_if_eq:NNF \XeCJK_FullRight_and_Boundary: \XeCJK_check_FullRight:
1773     {
1774       \cs_set_eq:NN \XeCJK_save_FullRight_check:
1775         \XeCJK_FullRight_and_Boundary:
1776       \cs_set_eq:NN \XeCJK_save_FullRight_symbol:N
1777         \XeCJK_FullRight_symbol:N
1778       \cs_set_eq:NN \XeCJK_FullRight_and_Boundary:
1779         \XeCJK_check_FullRight:
1780       \cs_set_eq:NN \XeCJK_FullRight_symbol:N
1781         \XeCJK_check_FullRight_symbol:Nw
1782     }
1783   } ,
1784   CheckFullRight / false .code:n =
1785   {
1786     \cs_if_eq:NNT \XeCJK_FullRight_and_Boundary:
1787     \XeCJK_check_FullRight:
1788     {
1789       \cs_set_eq:NN \XeCJK_FullRight_and_Boundary:
1790         \XeCJK_save_FullRight_check:
1791       \cs_set_eq:NN \XeCJK_FullRight_symbol:N
1792         \XeCJK_save_FullRight_symbol:N

```

```

1792     }
1793   } ,
1794   CheckFullRight      .default:n = { true }
1795 }

```

```

\XeCJK_FullRight_symbol:N 1796 \cs_new_protected:Npn \XeCJK_FullRight_symbol:N
1797 {
1798   \XeCJK_fallback_punct_symbol:NN
1799   \CJKpunctsymbol
1800 }

```

```

\XeCJK_check_FullRight: 1801 \cs_new_protected:Npn \XeCJK_check_FullRight:
1802 {
1803   \XeCJK_get_punct_bounds:No \c XeCJK_right_tl \g XeCJK_last_punct_tl
1804   \XeCJK_punct_rule:NN \c XeCJK_right_tl \g XeCJK_last_punct_tl
1805   \group_align_safe_begin:
1806   \token_case_meaning:NoTF
1807   \l_peek_token 1807 { \l
1808   XeCJK_no_break_cs_case_tl } 1808 {
1809     \group_align_safe_end:
1810     \XeCJK_no_break:
1811     \group_insert_after:N \XeCJK_no_break:
1812   }
1813   { \group_align_safe_end: }
1814   \exp_after:wN \XeCJK_punct_node:N \g XeCJK_last_punct_tl
1815   \XeCJK_class_group_end:
1816   \XeCJK_punct_glue:NN \c XeCJK_right_tl \g XeCJK_last_punct_tl
1817 }
1818 \prg_generate_conditional_variant:Nnn \token_case_meaning:Nn { No } { TF , F }

```

```

\XeCJK_check_FullRight_symbol:Nw 1819 \cs_new_protected:Npn \XeCJK_check_FullRight_symbol:Nw #1
1820 { \peek_remove_spaces:n { \ XeCJK_save_FullRight_symbol:N #1 } }

```

```

\XeCJK_cs_case_keys_define:nNNnn 1821 \cs_new_protected:Npn \XeCJK_cs_case_keys_define:nNNnn #1#2#3#4#5
1822 {
1823   \tl_new:N #2
1824   \seq_new:N #3
1825   \keys_define:nn { XeCJK / options }
1826   {
1827     #1 .code:n =
1828     {
1829       \seq_set_split:Nnn #3 { } {##1}
1830       \XeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
1831     } ,
1832     #1+ .code:n =
1833     {
1834       \tl_map_inline:nn {##1}
1835       { \seq_if_in:NnF #3 {####1} { \seq_put_right:Nn #3 {####1} } }
1836       \XeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
1837     } ,
1838     #1- .code:n =
1839     {
1840       \tl_map_inline:nn {##1} { \seq_remove_all:Nn #3 {####1} }
1841       \XeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
1842     }
1843   }
1844 }
1845 \cs_new_protected:Npn \XeCJK_update_cs_case_tl:NNnn #1#2#3#4
1846 {
1847   \tl_clear:N #1
1848   \seq_map_inline:Nn #2 { \tl_put_right:Nn #1 { { ##1} { #3} } }
1849   #4
1850 }

```

NoBreakCS sets the control sequence that cannot break a line after a full-corner right marker.

```

1851 \XeCJK_cs_case_keys_define:nNNnn { NoBreakCS }
1852 \l XeCJK_no_break_cs_case_tl \l XeCJK_no_break_cs_seq { } { }

```

\xeCJKnobreak To be on the safe side, we use a loop here.

```

1853 \NewDocumentCommand \xeCJKnobreak { }
1854 {
1855   \bool_set_true:N \l xeCJK_tmp_bool
1856   \int_while_do:nNnn \tex_lastnodetype:D = \c xeCJK_glue_node
1857   {
1858     \bool_if:NTF \l xeCJK_tmp_bool
1859     {
1860       \bool_set_false:N \l xeCJK_tmp_bool
1861       \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
1862     }
1863     { \skip_add:Nn \l xeCJK_last_skip \tex_lastskip:D }
1864   } \tex_unskip:D
1865 }
1866 \xeCJK_if_last_node:TF
1867 {
1868   \dim_set_eq:NN \l xeCJK_tmp_dim \l xeCJK_last_kern_dim
1869   \xeCJK_if_last_node:TF
1870   {
1871     \xeCJK_if_last_glue:TF
1872     {
1873       \exp_args:NNNo \tex_unskip:D \xeCJK_no_break:
1874       \skip_horizontal:n { \skip_use:N \tex_lastskip:D }
1875     }
1876     \xeCJK_make_node:N \l xeCJK_last_kern_dim
1877   }
1878   {}
1879   \xeCJK_make_node:N \l xeCJK_tmp_dim
1880 }
1881 {}
1882 \xeCJK_no_break:
1883 \bool_if:NF \l xeCJK_tmp_bool
1884 { \skip_horizontal:N \l xeCJK_last_skip }
1885 }

```

5.8 End-of-paragraph orphan word processing

CheckSingle The orphan word processing function option.

```

1886 \keys_define:nn { xeCJK / options }
1887 {
1888   CheckSingle .choice: ,
1889   CheckSingle / true .code:n =
1890   {
1891     \cs_if_eq:NNF \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
1892     {
1893       \cs_set_eq:NN \xeCJK_check_single_save:N \xeCJK_CJK_and_CJK:N
1894       \cs_set_eq:NN \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
1895     }
1896   } ,
1897   CheckSingle / false .code:n =
1898   {
1899     \cs_if_eq:NNT \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
1900     { \cs_set_eq:NN \xeCJK_CJK_and_CJK:N \xeCJK_check_single_save:N }
1901   } ,
1902   CheckSingle .default:n = { true } ,
1903   CJKchecksingle .meta:n = { CheckSingle = true }
1904 }

```

WidowPenalty sets the penalty of the Chinese character at the end of the paragraph. The default value is 10 000.

```

1905 \keys_define:nn { xeCJK / options }
1906 {
1907   WidowPenalty .int_set:N = \l xeCJK_widow_penalty_int ,
1908   WidowPenalty .default:n = { 10 000 }
1909 }

```

`\xeCJK_widow_penalty`: The penalty inserted at the end of the prevention paragraph, the value is `\l xeCJK_widow_penalty_int`.

```
1910 \cs_new_protected:Npn \xeCJK_widow_penalty:
1911   { \tex_penalty:D \l xeCJK_widow_penalty_int }
```

```
\xeCJK_check_single:Nw 1912 \cs_new_protected:Npn \xeCJK_check_single:Nw #1
\ xeCJK_check_single_end:N 1913   {
1914     \group_align_safe_begin:
1915     \peek_catcode:NTF \c_catcode_letter_token
1916     { \xeCJK_check_single:NNw #1 }
1917     {
1918       \token_if_other:NTF \l_peek_token
1919       { \xeCJK_check_single:NNw }
1920       { \ xeCJK_check_single_end:N }
1921     } #1
1922   }
1923 }
1924 \cs_new_protected:Npn \ xeCJK_check_single_end:N
1925   {
1926     \group_align_safe_end:
1927     \ xeCJK_check_single_save:N
1928   }
```

`\xeCJK_check_single:NNw` uses `\group_align_safe_begin:` and `\group_align_safe_end:` to prevent errors from being reported inside the table.

```
\ xeCJK_check_single_aux:nNNw 1929 \cs_new_protected:Npn \xeCJK_check_single:NNNw #1#2
1930   {
1931     \xeCJK_peek_catcode_ignore_spaces:NTF \c_catcode_letter_token
1932     {
1933       \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
1934       {
1935         \bool_if:NTF \l xeCJK_reserve_space_bool
1936         { \ xeCJK_check_single_end:N #1 #2 ~ }
1937         { \ xeCJK_check_single_space:NN #1#2 }
1938       }
1939       { \ xeCJK_check_single_end:N #1 #2 }
1940     }
1941     {
1942       \token_if_other:NTF \l_peek_token
1943       {
1944         \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
1945         { \ xeCJK_check_single_space:NN }
1946         { \ xeCJK_check_single_end:N }
1947       }
1948       {
1949         \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
1950         { \ xeCJK_check_single_aux:nNNw { ~ } }
1951         { \ xeCJK_check_single_aux:nNNw { } }
1952       }
1953     } #1 #2
1954   }
1955 }
1956 \cs_new_protected:Npn \ xeCJK_check_single_aux:nNNw #1#2#3
1957   {
1958     \token_if_cs:NTF \l_peek_token
1959     { \xeCJK_check_single_cs:NNn }
1960     { \xeCJK_check_single_end:NNnw }
1961     #2 #3 {#1}
1962   }
\xeCJK_check_single_end:NNnw 1963 \cs_new_protected:Npn \xeCJK_check_single_end_aux:NNn #1#2#3
\xeCJK_check_single_end_aux:NNn 1964   { \ xeCJK_check_single_end:N #1 #2 #3 }
\xeCJK_check_single_end_equation:NNnw 1965 \cs_new_eq:NN \ xeCJK_check_single_end:NNnw \ xeCJK_check_single_end_aux:NNn
1966 \cs_new_protected:Npn \ xeCJK_check_single_end_equation:NNnw
1967   {
1968     \token_if_math_toggle:NTF \l_peek_token
1969     { \xeCJK_check_single_equation:NNnNw }
1970     { \ xeCJK_check_single_end_aux:NNn }
1971   }
```

```

PlainEquation 1972 \keys_define:nn { xecjk / options }
1973 {
1974   PlainEquation .choice: ,
1975   PlainEquation / true .code:n =
1976     {
1977       \cs_set_eq:NN \xecjk_check_single_end:NNnw
1978         \xecjk_check_single_end_equation:NNnw
1979     } ,
1980   PlainEquation / false .code:n =
1981     {
1982       \cs_set_eq:NN \xecjk_check_single_end:NNnw
1983         \xecjk_check_single_end_aux:NNn
1984     } ,
1985   PlainEquation .default:n = { true } ,
1986 }

```

```

\xecjk_check_single_space:NN 1987 \cs_new_protected:Npn \xecjk_check_single_space:NN #1#2
1988 {
1989   \xecjk_if_cjk_class:NTF #2
1990   {
1991     \xecjk_if_cjk_class:NTF \l_peek_token
1992     { \xecjk_check_single_end:N #1 #2 }
1993     { \xecjk_check_single_end:N #1 #2 ~ }
1994   }
1995   { \xecjk_check_single_end:N #1 #2 ~ }
1996 }

```

```

\xecjk_check_single_equation:NNnNw 1997 \cs_new_protected:Npn \xecjk_check_single_equation:NNnNw #1#2#3#4
1998 {
1999   \peek_catcode:NTF \c_math_toggle_token
2000   {
2001     \xecjk_widow_penalty: \xecjk_check_single_end:N #1
2002     \xecjk_make_node:n { CJK-widow } #2 #4
2003   }
2004   { \xecjk_check_single_end:N #1 #2#3#4 }
2005 }

```

`\xecjk_check_single_cs:NNn` When using the `CheckSingle` option, the following error occurs in the `tabenum` environment defined by the `tablists` macro package.

```

! Forbidden control sequence found while scanning use of \use_ii:nn.
<inserted text>

```

```

\par
1.10 \item

```

The reason is that `tabenum` is actually a TEX alignment environment (`\halign`) where `\par` is redefined as `\cr`, and the `\ifx` judgments for `\par` are in the `\token_case_meaning:NnF` branch below. The solution is to wrap the judgments in `\group_align_safe_begin:` and `\group_align_safe_end:`. Or use the original word `\tex_-par:D` as a condition instead.

```

2006 \cs_new_protected:Npn \xecjk_check_single_cs:NNn #1#2#3
2007 {
2008   \token_case_meaning:NoF \l_peek_token
2009   { \l_peek_token \xecjk_check_single_cs_case_tl }
2010   { \use_iii:nnn }
2011   { \xecjk_check_single_env:nnNn }
2012   {
2013     \xecjk_widow_penalty:
2014     \xecjk_check_single_end:N #1
2015     \xecjk_make_node:n { CJK-widow } #2# 3
2016   }
2017   { \xecjk_check_single_end:N #1 #2#3 }
2018 }
2019 \tl_new:N \l_peek_token \xecjk_check_single_cs_case_tl

```

```

\xecjk_check_single_env:nnNn 2020 \cs_new_protected:Npn \xecjk_check_single_env:nnNn #1#2#3#4
2021 {
2022   \str_case_e:noTF {#4}
2023   { \l_peek_token \xecjk_check_single_env_case_tl }

```



```

2024     {#2}
2025     {#1}
2026     #3 {#4}
2027   }
2028 \prg_generate_conditional_variant:Nnn \str_case_e:nn { no } { TF }

```

```

NewLineCS 2029 \xeCJK_cs_case_keys_define:nNNnn { NewLineCS }
2030   \l_xeCJK_new_line_cs_case_tl \l_xeCJK_new_line_cs_seq
2031   { \use_ii:nnn }
2032   {
2033     \tl_concat:NNN \l_xeCJK_check_single_cs_case_tl
2034     \l_xeCJK_new_line_cs_case_tl \l_xeCJK_env_cs_case_tl
2035   }

```

```

EnvCS 2036 \xeCJK_cs_case_keys_define:nNNnn { EnvCS }
2037   \l_xeCJK_env_cs_case_tl \l_xeCJK_env_cs_seq
2038   { \use:n }
2039   {
2040     \tl_concat:NNN \l_xeCJK_check_single_cs_case_tl
2041     \l_xeCJK_new_line_cs_case_tl \l_xeCJK_env_cs_case_tl
2042   }

```

```

InlineEnv 2043 \keys_define:nn { xeCJK / options }
2044   {
2045     InlineEnv      .code:n =
2046     {
2047       \seq_set_from_clist:Nn \l_xeCJK_inline_env_seq {#1}
2048       \xeCJK_update_inline_env_case_tl:
2049     } ,
2050     InlineEnv+     .code:n =
2051     {
2052       \clist_map_inline:nn {#1}
2053       {
2054         \seq_if_in:NnF \l_xeCJK_inline_env_seq {##1}
2055         { \seq_put_right:Nn \l_xeCJK_inline_env_seq {##1} }
2056       }
2057       \xeCJK_update_inline_env_case_tl:
2058     } ,
2059     InlineEnv-     .code:n =
2060     {
2061       \clist_map_inline:nn {#1}
2062       { \seq_remove_all:Nn \l_xeCJK_inline_env_seq {##1} }
2063       \xeCJK_update_inline_env_case_tl:
2064     }
2065   }
2066 \seq_new:N \l_xeCJK_inline_env_seq

```

```

\xeCJK_update_inline_env_case_tl: 2067 \cs_new_protected:Npn \xeCJK_update_inline_env_case_tl:
2068   {
2069     \tl_clear:N \l_xeCJK_inline_env_case_tl
2070     \seq_map_inline:Nn \l_xeCJK_inline_env_seq
2071     { \tl_put_right:Nn \l_xeCJK_inline_env_case_tl { {##1} } }
2072   }
2073 \tl_new:N \l_xeCJK_inline_env_case_tl

```

5.9 Add CJK sub-partition

```

\g_xeCJK_CJK_sub_class_seq 2074 \seq_new:N \g_xeCJK_CJK_sub_class_seq

```

\xeCJKDeclareSubCJKBlock Declare the CJK subzone range, #1 is the custom name, #2 is the Unicode range of the subzone.

```

2075 \NewDocumentCommand \xeCJKDeclareSubCJKBlock
2076   { s > { \TrimSpaces } m m }
2077   {
2078     \xeCJK_declare_sub_char_class:nen { CJK } {#2} {#3}
2079     \IfBooleanT {#1} { \xeCJKResetPunctClass }
2080   }
2081 \@onlypreamble \xeCJKDeclareSubCJKBlock

```

\xeCJKCancelSubCJKBlock Cancels and resumes the declaration of a CJK subzone.
\xeCJKRestoreSubCJKBlock

```

2082 \bool_new:N \l_xeCJK_sub_cancel_bool
2083 \NewDocumentCommand \xeCJKCancelSubCJKBlock { s m }
2084 {
2085   \bool_if:NF \l_xeCJK_sub_cancel_bool
2086   {
2087     \bool_set_true:N \l_xeCJK_sub_cancel_bool
2088     \xeCJK_sub_restore_or_cancel:e {#2}
2089     \IfBooleanT {#1} { \xeCJKResetPunctClass }
2090   }
2091 }
2092 \NewDocumentCommand \xeCJKRestoreSubCJKBlock { s m }
2093 {
2094   \bool_if:NT \l_xeCJK_sub_cancel_bool
2095   {
2096     \bool_set_false:N \l_xeCJK_sub_cancel_bool
2097     \xeCJK_sub_restore_or_cancel:e {#2}
2098     \IfBooleanT {#1} { \xeCJKResetPunctClass }
2099   }
2100 }

```

```

\xeCJK_sub_restore_or_cancel:n 2101 \cs_new_protected:Npn \xeCJK_sub_restore_or_cancel:n #1
2102 {
2103   \clist_map_inline:nn {#1}
2104   {
2105     \int_if_exist:cTF { \xeCJK_class_csname:n { CJK/##1 } }
2106     {
2107       \xeCJK_declare_char_class:nn
2108       { CJK \bool_if:NF \l_xeCJK_sub_cancel_bool { /##1 } }
2109       { \use:c { g_xeCJK_CJK/##1_range_clist } }
2110     }
2111     { \xeCJK_error:nx { SubBlock-undefined } {##1} }
2112   }
2113 }
2114 \cs_generate_variant:Nn \xeCJK_sub_restore_or_cancel:n { e }
2115 \xeCJK_msg_new:nn { SubBlock-undefined }
2116 {
2117   The~CJK~sub~block~`#1'~is~undefined.\\\
2118   Try~to~use~\token_to_str:N \xeCJKDeclareSubCJKBlock \
2119   to~declare~it.
2120 }

```

```

\xeCJK_declare_sub_char_class:nnn 2121 \cs_new_protected:Npn \xeCJK_declare_sub_char_class:nnn #1#2#3
2122 {
2123   \int_if_exist:cF { \xeCJK_class_csname:n { #1/#2 } }
2124   {
2125     \xeCJK_new_class:n { #1/#2 }
2126     \xeCJK_set_sub_class_toks:nn {#1} {#2}
2127     \xeCJK_new_sub_key:n {#2}
2128   }
2129   \xeCJK_declare_char_class:nn { #1/#2 } {#3}
2130 }
2131 \cs_generate_variant:Nn \xeCJK_declare_sub_char_class:nnn { ne }

```

```

\xeCJK_set_sub_class_toks:nn 2132 \cs_new_protected:Npn \xeCJK_set_sub_class_toks:nn #1#2
2133 {
2134   \seq_map_inline:Nn \g_xeCJK_base_class_seq
2135   {
2136     \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } {##1} {#1} {##1}
2137     \xeCJK_copy_inter_class_toks:nnnn {##1} { #1/#2 } {##1} {#1}
2138     \str_if_eq:nnTF {##1} { CJK }
2139     {
2140       \xeCJK_pre_inter_class_toks:nnn {##1} { #1/#2 }
2141       { \xeCJK_switch_font:nn {#1} {#2} }
2142     }
2143     {
2144       \xeCJK_replace_inter_class_toks:nnnn {##1} { #1/#2 }
2145       { \xeCJK_fallback_symbol:NN }

```

```

2146         {
2147             \xeCJK_switch_font:nn {#1} {#2}
2148             \xeCJK_fallback_symbol:NN
2149         }
2150     }
2151 }
2152 \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } { #1/#2 } {#1} {#1}
2153 \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
2154 {
2155     \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } { #1/##1 } {#1} {#1} 2156
2156     \xeCJK_copy_inter_class_toks:nnnn { #1/##1 } { #1/#2 } {#1} {#1} 2157
2157     \xeCJK_pre_inter_class_toks:nnn { #1/#2 } { #1/##1 }
2158     { \xeCJK_switch_font:nn {#2} {##1} }
2159     \xeCJK_pre_inter_class_toks:nnn { #1/##1 } { #1/#2 }
2160     { \xeCJK_switch_font:nn {##1} {#2} }
2161 }
2162 \seq_gput_right:Nn \g xeCJK_CJK_sub_class_seq {#2}
2163 \xeCJK_save_CJK_class:n { #1/#2 }
2164 \clist_map_inline:nn { CJK , FullLeft , FullRight , HangulJamo }
2165 {
2166     \xeCJK_pre_inter_class_toks:nnn { #1/#2 } {##1}
2167     { \xeCJK_switch_font:nn {#2} {#1} }
2168 }
2169 }

```

5.10 Punctuation processing

`\XeTeXglyphbounds` gets the left and right margins of a character for punctuation compression. If it is not available, only the `plain` punctuation format will be used in the document to output punctuation as is.

```

2170 \cs_if_exist:NF \tex_XeTeXglyphbounds:D
2171 {
2172     \xeCJK_msg_new:nn { XeTeX-too-old }
2173     {
2174         \token_to_str:N \tex_XeTeXglyphbounds:D \ is~not~defined.\
2175         CJK~punctuation~kerning~will~not~be~available.\\\
2176         You~have~to~update~XeTeX~to~the~version~0.9995.0~or~later.
2177     }
2178     \xeCJK_error:n { XeTeX-too-old }
2179     \AtEndOfPackage
2180     {
2181         \keys_define:nn { xeCJK / options }
2182         {
2183             PunctStyle .code:n =
2184             { \xeCJK_error:nx { punct-style-unknown } {#1} }
2185         }
2186         \seq_gclear:N \g xeCJK_punct_style_seq
2187         \xeCJK_set_punct_style:n { plain } 2188
2189     }

```

`\xeCJKsetwidth` Manually set the width of the punctuation mark in the parameter.

```

2190 \NewDocumentCommand \xeCJKsetwidth { s m m }
2191 {
2192     \IfBooleanTF {#1}
2193     {
2194         \tl_map_inline:en {#2}
2195         { \tl_gset:cn { g xeCJK_punct_bound_width/##1/tl } {#3} }
2196     }
2197     {
2198         \tl_map_inline:en {#2}
2199         { \tl_gset:cn { g xeCJK_punct_width/##1/tl } {#3} }
2200     }
2201 }
2202 \@onlypreamble \xeCJKsetwidth
2203 \cs_generate_variant:Nn \tl_map_inline:nn { e }

```

`\xeCJKsetkern` Set the distance of adjacent markers manually.

```
2204 \NewDocumentCommand \xeCJKsetkern { m m m }
2205   { \tl_gset:cn { g xeCJK_punct/kern/#1/#2/tl } {#3} }
2206 \@onlypreamble \xeCJKsetkern
```

```
\c xeCJK_left_tl 2207 \tl_const:Nn \c xeCJK_left_tl { left }
\c xeCJK_right_tl 2208 \tl_const:Nn \c xeCJK_right_tl { right }
```

`AllowBreakBetweenPuncts` related option statement.

```
KaiMingPunct
LongPunct
MiddlePunct
PunctWidth
PunctBoundWidth
RubberPunctSkip
2209 \keys_define:nn { xeCJK / options }
2210 {
2211   AllowBreakBetweenPuncts .choice: ,
2212   AllowBreakBetweenPuncts / true .code:n =
2213     {
2214       \bool_set_true:N \l xeCJK_punct_breakable_bool
2215       \cs_set_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_breakable_kern:NN
2216       \cs_set_eq:NN \xeCJK_punct_bound_kern:N
2217         \xeCJK_punct_bound_breakable_kern:N
2218     } ,
2219   AllowBreakBetweenPuncts / false .code:n =
2220     {
2221       \bool_set_false:N \l xeCJK_punct_breakable_bool
2222       \cs_set_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_kern:NN
2223       \cs_set_eq:NN \xeCJK_punct_bound_kern:N
2224         \xeCJK_nobreak_hskip:N
2225     } ,
2226   AllowBreakBetweenPuncts .default:n = { true } ,
2227   KaiMingPunct .code:n = { \xeCJK_set_special_punct:nn { mixed_width } {#1} } ,
2228   KaiMingPunct+ .code:n = { \xeCJK_add_special_punct:nn { mixed_width } {#1} } ,
2229   KaiMingPunct- .code:n = { \xeCJK_sub_special_punct:nn { mixed_width } {#1} } ,
2230   LongPunct .code:n = { \xeCJK_set_special_punct:nn { long } {#1} } ,
2231   LongPunct+ .code:n = { \xeCJK_add_special_punct:nn { long } {#1} } ,
2232   LongPunct- .code:n = { \xeCJK_sub_special_punct:nn { long } {#1} } ,
2233   MiddlePunct .code:n = { \xeCJK_set_special_punct:nn { middle } {#1} } ,
2234   MiddlePunct+ .code:n = { \xeCJK_add_special_punct:nn { middle } {#1} } ,
2235   MiddlePunct- .code:n = { \xeCJK_sub_special_punct:nn { middle } {#1} } ,
2236   PunctWidth .tl_gset:N = \g xeCJK_punct_width_tl ,
2237   PunctBoundWidth .tl_gset:N = \g xeCJK_punct_bound_width_tl ,
2238   PunctWidth .value_required:n = true ,
2239   PunctBoundWidth .value_required:n = true ,
2240   RubberPunctSkip .choice: ,
2241   RubberPunctSkip .default:n = { true } ,
2242   RubberPunctSkip / true .code:n =
2243     { \cs_set_eq:NN \xeCJK_use_dim_or_skip:nNN \xeCJK_use_punct_skip:nNN } ,
2244   RubberPunctSkip / plus .code:n =
2245     { \cs_set_eq:NN \xeCJK_use_dim_or_skip:nNN \xeCJK_use_punct_skip_plus:nNN } ,
2246   RubberPunctSkip / minus .code:n =
2247     { \cs_set_eq:NN \xeCJK_use_dim_or_skip:nNN \xeCJK_use_punct_skip_minus:nNN } ,
2248   RubberPunctSkip / false .code:n =
2249     { \cs_set_eq:NN \xeCJK_use_dim_or_skip:nNN \xeCJK_use_punct_dim:nNN }
2250 }
2251 \bool_new:N \l xeCJK_punct_breakable_bool
```

The helper function defined by the associated option.

```
2252 \clist_new:N \g xeCJK_special_punct_clist
2253 \clist_gset:Nn \g xeCJK_special_punct_clist { mixed_width , long , middle }
2254 \cs_new:Npn \xeCJK_special_punct_seq:n #1 { g xeCJK_special_punct_#1_seq }
2255 \cs_new:Npn \xeCJK_special_punct_tl:n #1#2 { g xeCJK_special_punct_#1_#2_tl }
2256 \clist_map_inline:Nn \g xeCJK_special_punct_clist
2257   { \seq_new:c { \xeCJK_special_punct_seq:n {#1} } }
2258 \cs_new_protected:Npn \xeCJK_set_special_punct:nn #1#2
2259   {
2260     \seq_map_inline:cn { \xeCJK_special_punct_seq:n {#1} }
2261       { \cs_undefine:c { \xeCJK_special_punct_tl:n {#1} {##1} } }
2262     \seq_gclear:c { \xeCJK_special_punct_seq:n {#1} }
```

```

2263 \tl_map_inline:en {#2}
2264 {
2265   \tl_new:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
2266   \seq_gput_right:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
2267 }
2268 }
2269 \cs_new_protected:Npn \ xeCJK_add_special_punct:nn #1#2
2270 {
2271   \tl_map_inline:en {#2}
2272   {
2273     \seq_if_in:cnF { \ xeCJK_special_punct_seq:n {#1} } {##1}
2274     {
2275       \tl_new:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
2276       \seq_gput_right:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
2277     }
2278   }
2279 }
2280 \cs_new_protected:Npn \ xeCJK_sub_special_punct:nn #1#2
2281 {
2282   \tl_map_inline:en {#2}
2283   {
2284     \cs_undefine:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
2285     \seq_gremove_all:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
2286   }
2287 }

```

Determine if a punctuation mark is full right and long punctuation.

```

2288 \prg_new_conditional:Npnn \ xeCJK_punct_if_right:N #1 { p , T , F , TF }
2289 {
2290   \if_int_compare:w \xeCJK_token_value_class:N #1 =
2291     \xeCJK_class_num:n { FullRight }
2292   \prg_return_true: \else: \prg_return_false: \fi: 2293
2293 }
2294 \clist_map_inline:Nn \g xeCJK_special_punct_clist
2295 {
2296   \exp_args:Nc
2297   \prg_new_conditional:Npnn { xeCJK_punct_if_#1:N } ##1 { p , T , F , TF }
2298   {
2299     \if_cs_exist:w \ xeCJK_special_punct_tl:nN {#1} {##1} \cs_end:
2300     \prg_return_true: \else: \prg_return_false: \fi:
2301   }
2302 }

```

Some helper functions for logging.

```

2303 \cs_new:Npn \ xeCJK_punct_csname:n #1
2304 { c xeCJK_\l xeCJK_current_punct_font_tl/\l xeCJK_punct_style_tl/#1/tl }
2305 \cs_new:Npn \ xeCJK_use_punct_dim:nN #1#2
2306 { \use:c { \ xeCJK_punct_csname:n { dim/#1/#2 } } }
2307 \cs_new:Npn \ xeCJK_use_punct_dim:nNN #1#2#3
2308 { \use:c { \ xeCJK_punct_csname:n { dim/#1/#2/#3 } } }
2309 \cs_new:Npn \ xeCJK_use_punct_skip:nNN #1#2#3
2310 { \use:c { \ xeCJK_punct_csname:n { skip/#1/#2/#3 } } }
2311 \cs_new:Npn \ xeCJK_use_punct_skip_plus:nNN #1#2#3
2312 { \use:c { \ xeCJK_punct_csname:n { skip/plus/#1/#2/#3 } } }
2313 \cs_new:Npn \ xeCJK_use_punct_skip_minus:nNN #1#2#3
2314 { \use:c { \ xeCJK_punct_csname:n { skip/minus/#1/#2/#3 } } }
2315 \cs_new_protected:Npn \ xeCJK_save_punct_dim:nNn #1#2
2316 { \ xeCJK_save_punct_width_aux:nnnn { dim } {#1} { #1/#2 } }
2317 \cs_new_protected:Npn \ xeCJK_save_punct_dim:nNNn #1#2#3
2318 { \ xeCJK_save_punct_width_aux:nnnn { dim } {#1} { #1/#2/#3 } }
2319 \cs_new_protected:Npn \ xeCJK_save_punct_skip:nNNn #1#2#3#4
2320 {
2321   \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { #1/#2/#3 } {#4}
2322   \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { plus/#1/#2/#3 } {#4}
2323   \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { minus/#1/#2/#3 } {#4} 2324
2324 }

```

```

2325 \cs_new_protected:Npn \xeCJK_save_punct_skip:nNNnnn #1#2#3#4#5#6
2326 {
2327   \exp_last_unbraced:Ne
2328   \xeCJK_save_punct_skip_aux:nnnnnn
2329   {
2330     {#1}
2331     { #1/#2/#3 }
2332     { \dim_eval:n {#4} }
2333     { \dim_max:nn { \c_zero_dim } {#5} }
2334     { \dim_max:nn { \c_zero_dim } {#6} }
2335   }
2336 }
2337 \cs_new_protected:Npn \xeCJK_save_punct_skip_aux:nnnnnn #1#2#3#4#5
2338 {
2339   \xeCJK_save_punct_width_aux:nnnn { skip } {#1}
2340   {#2} { #3 ~ plus ~ #4 ~ minus ~ #5 ~ }
2341   \xeCJK_save_punct_width_aux:nnnn { skip } {#1}
2342   { plus/#2 } { #3 ~ plus ~ #4 ~ }
2343   \xeCJK_save_punct_width_aux:nnnn { skip } {#1}
2344   { minus/#2 } { #3 ~ minus ~ #5 ~ }
2345 }
2346 \cs_new_protected:Npn \xeCJK_save_punct_width_aux:nnnn #1#2#3#4
2347 {
2348   \xeCJK_save_punct_width_aux:cen
2349   { \xeCJK_punct_csname:n { #1/#3 } }
2350   { \use:c { #1_eval:n } {#4} }
2351   {#2}
2352 }
2353 \cs_new_protected:Npn \xeCJK_save_punct_width_aux:Nnn #1#2#3
2354 {
2355   \tl_const:Nn #1 {#2}
2356   \str_if_eq:nnT {#3} { glue }
2357   { \prop_gput:Nnn \gxeCJK_punct_skip_prop {#2} {} }
2358 }
2359 \prop_new:N \gxeCJK_punct_skip_prop
2360 \prop_gput:Non \gxeCJK_punct_skip_prop { \skip_use:N \c_zero_skip } {}
2361 \cs_generate_variant:Nn \xeCJK_save_punct_width_aux:Nnn { ce }
2362 \cs_new_eq:NN \xeCJK_use_dim_or_skip:nNN \xeCJK_use_punct_skip:nNN

```

Define the punctuation processing template.

```

2363 \DeclareObjectType {xeCJK / punctuation} { 0 }
2364 \DeclareTemplateInterface {xeCJK / punctuation} { basic } { 0 }
2365 {
2366   enabled-global-setting : boolean = true ,
2367   fixed-punct-width      : length = \c_max_dim ,
2368   fixed-punct-ratio      : real    = \c_one_fp ,
2369   mixed-punct-width      : length = \KeyValue { fixed-punct-width } ,
2370   mixed-punct-ratio      : real    = \KeyValue { fixed-punct-ratio } , 2371
2372   middle-punct-width     : length = \KeyValue { fixed-punct-width } ,
2373   middle-punct-ratio     : real    = \KeyValue { fixed-punct-ratio } , 2373
2374   fixed-margin-width     : length = \c_max_dim ,
2375   fixed-margin-ratio     : real    = \c_one_fp ,
2376   mixed-margin-width     : length = \KeyValue { fixed-margin-width } ,
2377   mixed-margin-ratio     : real    = \KeyValue { fixed-margin-ratio } , 2377
2378   middle-margin-width    : length = \KeyValue { fixed-margin-width } ,
2379   middle-margin-ratio    : real    = \KeyValue { fixed-margin-ratio } , 2379
2380   bound-punct-width      : length = \c_max_dim ,
2381   bound-punct-ratio      : real    = \c_nan_fp ,
2382   bound-margin-width     : length = \c_max_dim ,
2383   =
2384   s
2385   y
2386   n
2387   c,
2388   c
2389   o
2390   rr

```



```

an
==
2412 mixed-margin-ratio = \l xeCJK_mixed_margin_ratio_fp ,
2413 middle-margin-width = \l xeCJK_middle_margin_width_dim ,
2414 middle-margin-ratio = \l xeCJK_middle_margin_ratio_fp ,
2415 bound-punct-width = \l xeCJK_bound_punct_width_dim ,
2416 bound-punct-ratio == \l xeCJK_bound_punct_ratio_fp ,
sy
nc
,
co
rr
ec
te
d
by
el
de
r
m
an
==
2417 bound-margin-width == \l xeCJK_bound_margin_width_dim ,
sy
nc
,
co
rr
ec
te
d
by
el
de
r
m
an
==
2418 bound-margin-ratio = \l xeCJK_bound_margin_ratio_fp ,
2419 enabled-hanging = \l xeCJK_enabled_hanging_bool ,
2420 add-min-bound-to-margin = \l xeCJK_add_min_bound_to_margin_bool ,
2421 optimize-margin = \l xeCJK_optimize_margin_bool ,
2422 margin-minimum = \l xeCJK_margin_minimum_dim ,
2423 enabled-kerning = \l xeCJK_enabled_kerning_bool ,
2424 min-bound-to-kerning = \l xeCJK_min_bound_to_kerning_bool ,
2425 kerning-total-width = \l xeCJK_kerning_total_width_dim ,
2426 kerning-total-ratio = \l xeCJK_kerning_total_ratio_fp ,
2427 optimize-kerning = \l xeCJK_optimize_kerning_bool ,
2428 same-align-margin = \l xeCJK_same_align_margin_dim ,
2429 same-align-ratio = \l xeCJK_same_align_ratio_fp ,
2430 different-align-margin = \l xeCJK_different_align_margin_dim ,
2431 different-align-ratio = \l xeCJK_different_align_ratio_fp ,
2432 kerning-margin-width = \l xeCJK_kerning_margin_width_dim ,
2433 kerning-margin-ratio = \l xeCJK_kerning_margin_ratio_fp ,
2434 kerning-margin-minimum = \l xeCJK_kerning_margin_minimum_dim
2435 }
2436 { \AssignTemplateKeys }

```

`\xeCJK_get_punct_bounds:NN #1` for `\c xeCJK_left_tl` or `\c xeCJK_right_tl#2` for punctuation.

```

2437 \cs_new_protected:Npn \xeCJK_get_punct_bounds:NN #1#2
2438 {
2439   \tl_if_exist:cF { \ xeCJK_punct_csname:n { dim/glue/#1/#2 } }
2440   { \ xeCJK_get_punct_bounds_aux:NN #1 #2 }
2441 }
2442 \cs_new_protected:Npn \ xeCJK_get_punct_bounds_aux:NN
2443 {
2444   \tl_if_eq:NNTF \l xeCJK_punct_style_tl \c xeCJK_punct_style_plain_tl
2445   { \ xeCJK_save_punct_margin_plain:NN }
2446   { \ xeCJK_save_punct_margin:NN }
2447 }
2448 \cs_new_protected:Npn \xeCJK_get_punct_bounds:No
2449 { \exp_last_unbraced:NNo \xeCJK_get_punct_bounds:NN }
2450 \cs_new_protected:Npn \ xeCJK_save_punct_margin_plain:NN #1#2
2451 {

```



```

2453 \xeCJK_save_punct_dim:nNNn { offset } #1 #2 { \c_zero_dim }
2454 \xeCJK_save_punct_dim:nNNn { margin } #1 #2 { \c_zero_dim }
2455 \xeCJK_save_punct_dim:nNNn { rule } \c xeCJK_left_tl {#2} { \c_zero_dim }
2456 \xeCJK_save_punct_dim:nNNn { rule } \c xeCJK_right_tl {#2} { \c_zero_dim }
2457 \xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_left_tl {#2} { \c_zero_dim }
2458 \xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_right_tl {#2} { \c_zero_dim }
2459 \xeCJK_save_punct_skip:nNNn { glue } #1 #2 { \c_zero_skip }
2460 }
2461 \cs_new_protected:Npn \xeCJK_save_punct_margin:NN #1#2
2462 {
2463   \group_begin:
2464     \xeCJK_select_punct_font:
2465     \xeCJK_fallback_punct_symbol:NN
2466     \xeCJK_calc_punct_dimen:N #2
2467   \group_end:
2468   \dim_set:Nn \l xeCJK_bound_dim
2469     { \xeCJK_use_punct_dim:nNN { bound } #1 #2 }
2470   \tl_if_eq:NNTF #1 \c xeCJK_right_tl
2471     { \tl_set_eq:NN \l xeCJK_reverse_tl \c xeCJK_left_tl } 2472
     { \tl_set_eq:NN \l xeCJK_reverse_tl \c xeCJK_right_tl } 2473
   \dim_set:Nn \l xeCJK_reverse_bound_dim
2474     { \xeCJK_use_punct_dim:nNN { bound } \l xeCJK_reverse_tl #2 } 2475
   \UseInstance { xeCJK / punctuation } { \l xeCJK_punct_style_tl } 2476
   \xeCJK_punct_margin_process:NN #1 #2
2477   \xeCJK_punct_offset_process:NN #1 #2
2478   \xeCJK_punct_if_long:NT #2
2479     { \xeCJK_long_punct_kerning:N #2 }
2480 }
2481 \tl_new:N \l xeCJK_reverse_tl
2482 \dim_new:N \l xeCJK_bound_dim
2483 \dim_new:N \l xeCJK_reverse_bound_dim

```

`\xeCJK_long_punct_kerning:N` Same long punctuation compression. For dashes, calculate the space between two punctuation points to ensure that it is not broken in the middle. Note that the boundary of the dash may be negative (e.g., Founder’s New Book Song). Compression is not necessary at this time.

```

2484 \cs_new_protected:Npn \xeCJK_long_punct_kerning:N #1
2485 {
2486   \dim_set:Nn \l xeCJK_tmp_dim
2487   {
2488     \dim_max:nn
2489     { \l xeCJK_bound_dim + \l xeCJK_reverse_bound_dim }
2490     { \c_zero_dim }
2491   }
2492   \xeCJK_save_punct_dim:nNNn { bound_width } #1 #1 { \l xeCJK_tmp_dim }
2493   \dim_set:Nn \l xeCJK_tmp_dim
2494   {
2495     \str_case:nnTF {#1}
2496     { { ^^^^2025 } { } { ^^^^2026 } { } }
2497     { \c_zero_dim }
2498     { -\l xeCJK_tmp_dim }
2499   }
2500   \xeCJK_save_punct_dim:nNNn { kern } #1 #1 { \l xeCJK_tmp_dim } 2501
   \xeCJK_save_punct_skip:nNNn { kern } #1 #1 { \l xeCJK_tmp_dim } 2502
   \dim_add:Nn \l xeCJK_tmp_dim
2503   { \dim_max:nn { \l xeCJK_bound_dim } { \c_zero_dim } }
2504   \xeCJK_save_punct_dim:nNNn { bound_kern } #1 #1 { \l xeCJK_tmp_dim }
2505   \xeCJK_save_punct_skip:nNNn { bound_kern } #1 #1 { \l xeCJK_tmp_dim }
2506 }

```

`\xeCJK_get_punct_kerning:NN` punctuation compression.

```

2507 \cs_new_protected:Npn \xeCJK_get_punct_kerning:NN #1#2
2508 {
2509   \tl_if_exist:cF { \xeCJK_punct_csname:n { dim/kern/#1/#2 } }
2510   {
2511     \tl_if_eq:NNTF \l xeCJK_punct_style_tl \c xeCJK_punct_style_plain_tl
2512     { \xeCJK_save_punct_kerning_plain:NN }

```

```

2513         { \ xeCJK_save_punct_kerning:NN }
2514         #1 #2
2515     }
2516 }
2517 \cs_new_protected:Npn \xeCJK_get_punct_kerning:oN
2518     { \exp_after:wN \xeCJK_get_punct_kerning:NN }
2519 \cs_new_protected:Npn \ xeCJK_save_punct_kerning_plain:NN #1#2
2520     {
2521     \ xeCJK_save_punct_dim:nNNn { kern } #1 #2 { \c_zero_dim }
2522     \ xeCJK_save_punct_dim:nNNn { bound_kern } #1 #2 { \c_zero_dim }
2523     \ xeCJK_save_punct_dim:nNNn { bound_width } #1 #2 { \c_zero_dim } 2524
2524     \ xeCJK_save_punct_skip:nNNn { kern } #1 #2 { \c_zero_skip }
2525     \ xeCJK_save_punct_skip:nNNn { bound_kern } #1 #2 { \c_zero_skip }
2526     }
2527 \cs_new_protected:Npn \ xeCJK_save_punct_kerning:NN
2528     {
2529     \UseInstance { xeCJK / punctuation } { \l_xeCJK_punct_style_tl }
2530     \xeCJK_punct_kerning_process:NN
2531     }
\xeCJK_punct_margin_process:NN 2532 \cs_new_protected:Npn \xeCJK_punct_margin_process:NN #1#2
2533     {
2534     \dim_set:Nn \l_xeCJK_tmp_dim
2535     {
2536     \bool_if:NTF \l_xeCJK_enabled_global_setting_bool
2537     {
2538     \cs_if_exist_use:cF { g xeCJK_punct_width/#2/tl }
2539     {
2540     \tl_if_empty:NTF \g xeCJK_punct_width_tl
2541     { \ xeCJK_calc_punct_width:N #2 }
2542     { \g xeCJK_punct_width_tl }
2543     }
2544     }
2545     { \ xeCJK_calc_punct_width:N #2 }
2546     }
2547     \dim_set:Nn \l_xeCJK_margin_dim
2548     {
2549     \dim_max:nn
2550     { \l_xeCJK_margin_minimum_dim }
2551     {
2552     \dim_compare:nNnTF \l_xeCJK_tmp_dim < \c_max_dim
2553     {
2554     \ xeCJK_punct_if_middle:NTF #2
2555     {
2556     ( \l_xeCJK_tmp_dim
2557     - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
2558     ) / 2
2559     }
2560     {
2561     \bool_if:NTF \l_xeCJK_optimize_margin_bool
2562     {
2563     \dim_max:nn
2564     {
2565     \dim_min:nn
2566     { \l_xeCJK_bound_dim }
2567     { \l_xeCJK_reverse_bound_dim }
2568     }
2569     }
2570     { \use:n }
2571     {
2572     \l_xeCJK_tmp_dim
2573     - \l_xeCJK_reverse_bound_dim
2574     - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
2575     }
2576     }
2577     }
2578     {
2579     \bool_if:NTF \l_xeCJK_optimize_margin_bool

```

```

2580         { \dim_min:nn { \l xeCJK_bound_dim } }
2581         { \use:n }
2582         { \ xeCJK_calc_margin_width:N #2 }
2583     }
2584 }
2585 }
2586 \ xeCJK_save_punct_dim:nNNn { margin } #1 #2 { \l xeCJK_margin_dim }
2587 }
2588 \dim_new:N \l xeCJK_margin_dim

```

```

\ xeCJK_calc_punct_width:N 2589 \cs_new:Npn \ xeCJK_calc_punct_width:N #1
2590 {
2591   \ xeCJK_punct_if_middle:NTF #1
2592   { \ xeCJK_punct_width_or_ratio:nN { middle }
2593     {
2594       \ xeCJK_punct_if_mixed_width:NTF #1
2595       { \ xeCJK_punct_width_or_ratio:nN { mixed } }
2596       { \ xeCJK_punct_width_or_ratio:nN { fixed } }
2597     }
2598     #1
2599 }

```

```

\ xeCJK_calc_margin_width:N 2600 \cs_new:Npn \ xeCJK_calc_margin_width:N #1
2601 {
2602   \ xeCJK_punct_if_middle:NTF #1
2603   {
2604     \dim_compare:nNnTF \l xeCJK_middle_margin_width_dim < \c_max_dim
2605     { \l xeCJK_middle_margin_width_dim }
2606     {
2607       \ xeCJK_dim_ratio:Nn \l xeCJK_middle_margin_ratio_fp
2608       { ( \l xeCJK_bound_dim + \l xeCJK_reverse_bound_dim ) / 2 }
2609     }
2610   }
2611   {
2612     \ xeCJK_punct_if_mixed_width:NTF #1
2613     { \ xeCJK_margin_width_or_ratio:n { mixed } }
2614     { \ xeCJK_margin_width_or_ratio:n { fixed } }
2615   }
2616 }

```

```

\ xeCJK_dim_ratio:Nn 2617 \cs_new:Npn \ xeCJK_dim_ratio:Nn #1#2
2618 { \fp_to_dim:n { #1 \dim_to_fp:n { #2 } } }
2619 \cs_generate_variant:Nn \ xeCJK_dim_ratio:Nn { c }

```

```

\ xeCJK_punct_offset_process:NN 2620 \cs_new_protected:Npn \ xeCJK_punct_offset_process:NN #1#2
2621 {
2622   \dim_set:Nn \l xeCJK_tmp_dim
2623   {
2624     \bool_if:NTF \l xeCJK_enabled_global_setting_bool
2625     {
2626       \cs_if_exist_use:cF { g xeCJK_punct_bound_width/#2/tl }
2627       {
2628         \tl_if_empty:NTF \g xeCJK_punct_bound_width_tl
2629         { \ xeCJK_punct_width_or_ratio:nN { bound } #2 }
2630         { \g xeCJK_punct_bound_width_tl }
2631       }
2632     }
2633     { \ xeCJK_punct_width_or_ratio:nN { bound } #2 }
2634   }
2635   \dim_set:Nn \l xeCJK_tmp_dim
2636   {
2637     \bool_if:NTF \l xeCJK_enabled_hanging_bool
2638     { \use:n }
2639     { \dim_max:nn { \l xeCJK_margin_minimum_dim } }
2640     {
2641       \dim_compare:nNnTF \l xeCJK_tmp_dim < \c_max_dim
2642       {
2643         \ xeCJK_punct_if_middle:NTF #2

```

```

2644     {
2645         \l xeCJK_tmp_dim
2646         - \l xeCJK_margin_dim
2647         - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
2648     }
2649     {
2650         \l xeCJK_tmp_dim
2651         - \l xeCJK_reverse_bound_dim
2652         - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
2653     }
2654 }
2655 {
2656     \bool_if:NTF \l xeCJK_optimize_margin_bool
2657     { \dim_min:nn { \l xeCJK_bound_dim } }
2658     { \use:n }
2659     { \ xeCJK_margin_width_or_ratio:n { bound } }
2660 }
2661 }
2662 }
2663 \ xeCJK_save_punct_dim:nNNn { offset } #1 #2
2664 { \l xeCJK_tmp_dim }
2665 \ xeCJK_save_punct_dim:nNNn { rule } #1 #2
2666 { \l xeCJK_tmp_dim - \l xeCJK_bound_dim }
2667 \ xeCJK_save_punct_dim:nNNn { rule } \l xeCJK_reverse_tl #2
2668 { \l xeCJK_tmp_dim - \l xeCJK_reverse_bound_dim }
2669 \ xeCJK_save_punct_dim:nNNn { glue } #1 #2 2670
2670 { \l xeCJK_margin_dim - \l xeCJK_tmp_dim }
2671 \ xeCJK_save_punct_skip:nNNnnn { glue } #1 #2
2672 { \l xeCJK_margin_dim - \l xeCJK_tmp_dim }
2673 {
2674     \ xeCJK_punct_if_middle:NTF #2
2675     {
2676         ( \ xeCJK_use_punct_dim:nN { width } #2 -
2677         \ xeCJK_use_punct_dim:nN { dimen } #2 ) / 2
2678         - \l xeCJK_margin_dim
2679     }
2680     { \l xeCJK_bound_dim - \l xeCJK_margin_dim }
2681 }
2682 {
2683     \ xeCJK_punct_if_middle:NTF #2
2684     { \l xeCJK_margin_dim / 2 }
2685     { \l xeCJK_margin_dim - \l xeCJK_reverse_bound_dim }
2686 }
2687 }

```

```

\ xeCJK_punct_width_or_ratio:nN 2688 \cs_new:Npn \ xeCJK_punct_width_or_ratio:nN #1#2

```

```

2689 {
2690     \dim_compare:nNnTF { \use:c { l xeCJK_#1_punct_width_dim } } < \c_max_dim
2691     { \use:c { l xeCJK_#1_punct_width_dim } }
2692     {
2693         \fp_if_nan:nTF { \use:c { l xeCJK_#1_punct_ratio_fp } }
2694         { \c_max_dim }
2695         {
2696             \ xeCJK_dim_ratio:cn
2697             { l xeCJK_#1_punct_ratio_fp }
2698             { \ xeCJK_use_punct_dim:nN { width } #2 }
2699         }
2700     }
2701 }

```

```

\ xeCJK_margin_width_or_ratio:n 2702 \cs_new:Npn \ xeCJK_margin_width_or_ratio:n #1

```

```

2703 {
2704     \dim_compare:nNnTF { \use:c { l xeCJK_#1_margin_width_dim } } < \c_max_dim
2705     { \use:c { l xeCJK_#1_margin_width_dim } }
2706     {
2707         \ xeCJK_dim_ratio:cn
2708         { l xeCJK_#1_margin_ratio_fp }

```

```

2709     { \l xeCJK_bound_dim }
2710   }
2711   \bool_if:NT \l xeCJK_add_min_bound_to_margin_bool
2712     { + + \dim_min:nn \l xeCJK_bound_dim \l xeCJK_reverse_bound_dim }
2713   }

```

`\xeCJK_punct_kerning_process:NN` Compression is not necessary when one of the punctures is a long punctuation.

```

2714 \cs_new_protected:Npn \xeCJK_punct_kerning_process:NN #1#2
2715   {
2716     \dim_set:Nn \l xeCJK_margin_dim
2717       { \ xeCJK_original_kerning_margin:NN #1 #2 }
2718     \dim_set:Nn \l xeCJK_minimum_bound_dim
2719       { \ xeCJK_punct_min_bound:NN #1 #2 }
2720     \xeCJK_punct_if_long:NTF #1
2721       { \bool_set_false:N \l xeCJK_enabled_kerning_bool }
2722       {
2723         \xeCJK_punct_if_long:NT #2
2724         { \bool_set_false:N \l xeCJK_enabled_kerning_bool }
2725       }
2726     \dim_set:Nn \l xeCJK_kerning_margin_dim
2727       {
2728         \bool_if:NTF \l xeCJK_enabled_global_setting_bool
2729           {
2730             \cs_if_exist_use:cF { g xeCJK_punct/kern/#1/#2/tl }
2731             { \ xeCJK_punct_kerning_process_aux:NN #1 #2 }
2732           }
2733           { \ xeCJK_punct_kerning_process_aux:NN #1 #2 }
2734       }
2735     \xeCJK_save_kerning:nnNN { kern } { bound } #1 #2
2736     \xeCJK_save_punct_dim:nNNn { bound_width } #1 #2
2737     { \l xeCJK_kerning_margin_dim - \l xeCJK_tmp_dim }
2738     \xeCJK_punct_if_right:NTF #1
2739     {
2740       \xeCJK_punct_if_right:NTF #2
2741       { \ xeCJK_save_kerning:nnnNN { bound_kern } { offset } { bound }
2742         { \ xeCJK_save_kerning:nnNN { bound_kern } { offset }
2743       }
2744       {
2745         \xeCJK_punct_if_right:NTF #2
2746         { \ xeCJK_save_kerning:nnNN { bound_kern } { bound } }
2747         { \ xeCJK_save_kerning:nnnNN { bound_kern } { bound } { offset }
2748       }
2749     } #1 #2
2750   }
2751 \cs_new:Npn \ xeCJK_punct_kerning_process_aux:NN #1#2
2752   {
2753     \bool_if:NTF \l xeCJK_enabled_kerning_bool
2754       { \ xeCJK_calc_kerning_margin:NN #1 #2 }
2755       { \l xeCJK_margin_dim }
2756   }
2757 \dim_new:N \l xeCJK_minimum_bound_dim
2758 \dim_new:N \l xeCJK_kerning_margin_dim

```

`\xeCJK_save_kerning:nnNN` The spacing between two adjacent punctuation marks can be stretched to the original margin (the state when uncompressed) or can be shrunk to a smaller margin.

```

2759 \cs_new_protected:Npn \ xeCJK_save_kerning:nnNN #1#2
2760   { \ xeCJK_save_kerning:nnnNN {#1} {#2} {#2} }
2761 \cs_new_protected:Npn \ xeCJK_save_kerning:nnnNN #1#2#3#4#5
2762   {
2763     \dim_set:Nn \l xeCJK_tmp_dim
2764       {
2765         \l xeCJK_kerning_margin_dim
2766         - ( \ xeCJK_use_punct_dim:nNN {#2} \c xeCJK_right_tl #4 )
2767         - ( \ xeCJK_use_punct_dim:nNN {#3} \c xeCJK_left_tl #5 )
2768       }
2769     \xeCJK_save_punct_dim:nNNn {#1} #4 #5 { \l xeCJK_tmp_dim }

```

```

2770 \xeCJK_save_punct_skip:nNNnnn {#1} #4 #5
2771 { \l xeCJK_tmp_dim }
2772 { \l xeCJK_margin_dim - \l xeCJK_kerning_margin_dim }
2773 { \l xeCJK_kerning_margin_dim - \l xeCJK_minimum_bound_dim }
2774 }

```

`\xeCJK_original_kerning_margin:NN` The original margin width between two adjacent punctuation marks.

```

2775 \cs_new:Npn \xeCJK_original_kerning_margin:NN #1#2
2776 {
2777   \dim_eval:n
2778   {
2779     \xeCJK_use_punct_dim:nNN
2780     { \xeCJK_punct_if_right:NTF #1 { margin } { bound } } \c xeCJK_right_tl #1
2781     +
2782     \xeCJK_use_punct_dim:nNN
2783     { \xeCJK_punct_if_right:NTF #2 { bound } { margin } } \c xeCJK_left_tl #2
2784   }
2785 }

```

`\xeCJK_calc_kerning_margin:NN` 2786 `\cs_new:Npn \xeCJK_calc_kerning_margin:NN #1#2`

`\xeCJK_calc_kerning_margin_aux:NN` 2787

```

2788 {
2789   \dim_max:nn
2790   { \l xeCJK_kerning_margin_minimum_dim }
2791   {
2792     \bool_if:NTF \l xeCJK_min_bound_to_kerning_bool
2793     { \l xeCJK_minimum_bound_dim }
2794     {
2795       \bool_if:NTF \l xeCJK_optimize_kerning_bool
2796       { \dim_max:nn { \l xeCJK_minimum_bound_dim } }
2797       { \use:n }
2798       { \xeCJK_calc_kerning_margin_aux:NN #1 #2 }
2799     }
2800   }
2801 \cs_new:Npn \xeCJK_calc_kerning_margin_aux:NN #1#2
2802 {
2803   \dim_compare:nNnTF \l xeCJK_kerning_total_width_dim < \c_max_dim
2804   { \xeCJK_calc_kerning_margin:nNN \l xeCJK_kerning_total_width_dim }
2805   {
2806     \fp_if_nan:nTF { \l xeCJK_kerning_total_ratio_fp }
2807     {
2808       \xeCJK_if_same_class:NNTF #1 #2
2809       { \xeCJK_kerning_width_or_ratio:nNN { same } }
2810       { \xeCJK_kerning_width_or_ratio:nNN { different } }
2811     }
2812     {
2813       \xeCJK_calc_kerning_margin:nNN
2814       {
2815         \xeCJK_dim_ratio:Nn \l xeCJK_kerning_total_ratio_fp
2816         {
2817           \xeCJK_use_punct_dim:nN { width } #1 +
2818           \xeCJK_use_punct_dim:nN { width } #2
2819         }
2820       }
2821     }
2822   }
2823   #1 #2
2824 }

```

`\xeCJK_kerning_width_or_ratio:nNN` 2825 `\cs_new:Npn \xeCJK_kerning_width_or_ratio:nNN #1#2#3`

```

2826 {
2827   \dim_compare:nNnTF { \use:c { \l xeCJK_#1_align_margin_dim } } < \c_max_dim
2828   { \use:c { \l xeCJK_#1_align_margin_dim } }
2829   {
2830     \fp_if_nan:nTF { \use:c { \l xeCJK_#1_align_ratio_fp } }
2831     {
2832       \dim_compare:nNnTF \l xeCJK_kerning_margin_width_dim < \c_max_dim

```

```

2833         {\l xecjk_kerning_margin_width_dim \use_none:n }
2834         {\ xecjk_dim_ratio:Nn \l xecjk_kerning_margin_ratio_fp }
2835     }
2836     {\ xecjk_dim_ratio:cn { l xecjk_#1_align_ratio_fp }}
2837     {\l xecjk_margin_dim }
2838 }
2839 }

```

`\xecjk_punct_min_bound:NN` ²⁸⁴⁰ `\cs_new:Npn \xecjk_punct_min_bound:NN #1#2`

```

2841 {
2842     \dim_max:nn
2843     {
2844         \dim_min:nn
2845         { \ xecjk_use_punct_dim:nNN { bound } \c
xecjk_left_tl #1 } 2846 { \ xecjk_use_punct_dim:nNN {
bound } \c xecjk_right_tl #1 } 2847 }
2848     {
2849         \dim_min:nn
2850         { \ xecjk_use_punct_dim:nNN { bound } \c
xecjk_left_tl #2 } 2851 { \ xecjk_use_punct_dim:nNN {
bound } \c xecjk_right_tl #2 } 2852 }
2853 }

```

`\xecjk_calc_kerning_margin:nNN` **#2** and **#3** are the two adjacent markers, and **#1** is the total width occupied by the two adjacent markers to be determined.

```

2854 \cs_new:Npn \xecjk_calc_kerning_margin:nNN #1#2#3
2855 {
2856     \dim_eval:n
2857     {
2858         (#1)
2859         - ( \ xecjk_use_punct_dim:nNN
2860             { \ xecjk_punct_if_right:NTF #2 { bound } { margin }
2861               \c xecjk_left_tl #2 )
2862         - ( \ xecjk_use_punct_dim:nNN
2863             { \ xecjk_punct_if_right:NTF #3 { margin } { bound }
2864               \c xecjk_right_tl #3 )
2865         - ( \ xecjk_use_punct_dim:nN { dimen } #2 )
2866         - ( \ xecjk_use_punct_dim:nN { dimen } #3 )
2867     }
2868 }

```

`\xecjk_calc_punct_dimen:N` Calculate the actual left and right margins and actual size of the punctuation point.

```

2869 \cs_new_protected:Npn \xecjk_calc_punct_dimen:N #1
2870 {
2871     \xecjk_save_punct_dim:nNNn { bound } \c xecjk_left_tl #1
2872     { \xecjk_glyph_bounds:NN 1 #1 }
2873     \xecjk_save_punct_dim:nNNn { bound } \c xecjk_right_tl #1
2874     { \xecjk_glyph_bounds:NN 3 #1 }
2875     \xecjk_save_punct_dim:nNn { width } #1
2876     { \tex_fontcharwd:D \tex_font:D `#1 } 2877
2877     \xecjk_save_punct_dim:nNn { dimen } #1
2878     {
2879         ( \ xecjk_use_punct_dim:nN { width } #1 )
2880         ( \ x e C J K _ u s e _ p u n c t _ d i m : n N N { bound } \c
xecjk_left_tl #1 ) - 2881 ( \
x e C J K _ u s e _ p u n c t _ d i m : n N N { bound } \c xecjk_right_tl #1 )
2882     }
2883 }

```

`\xecjk_glyph_bounds:NN` Use `\XeTeXglyphbounds` to get the top, bottom, left and right margins of punctuation marks.

```

2884 \cs_new:Npn \xecjk_glyph_bounds:NN #1#2
2885 { \tex_XeTeXglyphbounds:D #1 ~ \tex_XeTeXcharglyph:D `#2 \exp_stop_f: }

```

```

PunctStyle 2886 \keys_define:nn { xecjk / options }
2887 { PunctStyle .code:n = \exp_args:Nx \xecjk_set_punct_style:n {#1} }
2888 \cs_new_protected:Npn \xecjk_set_punct_style:n #1

```



```

2890 \IfInstanceExistTF { xeCJK / punctuation } {#1}
2891 { \tl_set:Nn \l_xeCJK_punct_style_tl {#1} }
2892 {
2893   \prop_get:NnNF \c xeCJK_punct_style_alias_prop
2894   {#1} \l_xeCJK_punct_style_tl
2895   { \ xeCJK_error:nx { punct-style-unknown } {#1} }
2896 }
2897 }
2898 \prop_const_from_keyval:Nn \c xeCJK_punct_style_alias_prop
2899 {
2900   halfwidth      = banjiao ,
2901   fullwidth      = quanjiao ,
2902   mixedwidth     = kaiming ,
2903   marginkerning = hangmobjiao ,
2904   plain          = plain
2905 }
2906 \tl_new:N \l_xeCJK_punct_style_tl
2907 \tl_const:Nn \c xeCJK_punct_style_plain_tl { plain }
2908 \ xeCJK_msg_new:nn { punct-style-unknown }
2909 {
2910   Punctuation~style~"#1"~is~unknown. \\\
2911   The~available~styles~are~listed~as~follow.\\\
2912   "plain,~\seq_use:Nnnn \g xeCJK_punct_style_seq
2913   { ~and~ } { ,~ } { ,~and~ }". \\\
2914 }

```

`\xeCJK_trim_spaces:n` **xparse** processing function, fully expand the arguments first and then delete the spaces on both sides.

```

2915 \cs_new_protected:Npn \ xeCJK_trim_spaces:n #1
2916 {
2917   \tl_set:Nx \ProcessedArgument
2918   { \exp_args:Ne \tl_trim_spaces:n {#1} }
2919 }

```

\xeCJKDeclarePunctStyle Define a new **punctuation** processing style, and the already existing style with the same name will be overwritten.

```

2920 \NewDocumentCommand \xeCJKDeclarePunctStyle
2921 { > { \ xeCJK_trim_spaces:n } m m }
2922 {
2923   \IfInstanceExistTF { xeCJK / punctuation } {#1}
2924   { \ xeCJK_warning:nx { punct-style-already-defined } {#1} }
2925   { \seq_gput_right:Nn \g xeCJK_punct_style_seq {#1} }
2926   \DeclareInstance { xeCJK / punctuation } {#1} { basic } {#2}
2927 }
2928 \seq_new:N \g xeCJK_punct_style_seq
2929 \ xeCJK_msg_new:nn { punct-style-already-defined }
2930 {
2931   Punctuation~style~"#1"~is~already~defined! \\\
2932   The~existing~style~of~"#1"~will~be~overwritten.\
2933 }
2934 \@onlypreamble \xeCJKDeclarePunctStyle

```

\xeCJKEditPunctStyle Modifications to existing **punctuation** handling styles.

```

2935 \NewDocumentCommand \xeCJKEditPunctStyle
2936 { > { \ xeCJK_trim_spaces:n } m m }2937 {
2938   \IfInstanceExistTF { xeCJK / punctuation } {#1}
2939   { \EditInstance { xeCJK / punctuation } {#1} {#2} }2940
2940   { \ xeCJK_error:nx { punct-style-unknown } {#1} }2941
2941 }
2942 \@onlypreamble \xeCJKEditPunctStyle

```

The default setting is the full-corner format.

```

2943 \xeCJKDeclarePunctStyle { quanjiao } {}
2944 \xeCJKDeclarePunctStyle { hangmobjiao } { enabled-kerning = false }

```

```

2945 \xeCJKDeclarePunctStyle { banjiao }
2946 {
2947   fixed-punct-ratio = 0.5 ,
2948   optimize-margin   = true ,
2949   kerning-total-ratio = 0.5 ,
2950   optimize-kerning = true
2951 }

2952 \xeCJKDeclarePunctStyle { kaiming }
2953 {
2954   fixed-punct-ratio   = 0.5 ,
2955   mixed-punct-ratio   = 0.8 ,
2956   optimize-margin     = true ,
2957   kerning-total-ratio = 0.5 ,
2958   optimize-kerning    = true
2959 }

2960 \xeCJKDeclarePunctStyle { CCT }
2961 {
2962   fixed-punct-ratio = 0.7 ,
2963   optimize-margin   = true ,
2964   kerning-total-ratio = 0.6 ,
2965   optimize-kerning = true
2966 }

```

5.11 Back-up fonts

Macro package option declaration for **AutoFallBack** back-up fonts.

```

2967 \keys_define:nn { xeCJK / options }
2968 {
2969   AutoFallBack .voice: ,
2970   AutoFallBack / true .code:n =
2971   {
2972     \cs_set_eq:NN \xeCJK_fallback_symbol:NN
2973     \xeCJK_fallback_symbol:NN
2974     \cs_set_eq:NN \xeCJK_fallback_punct_symbol:NN
2975     \xeCJK_fallback_punct_symbol:NN
2976     \cs_set_eq:NN \xeCJK_clear_fallback_font:
2977     \xeCJK_clear_fallback_font:
2978   } ,
2979   AutoFallBack / false .code:n =
2980   {
2981     \xeCJK_cs_clear:N \xeCJK_fallback_symbol:NN
2982     \xeCJK_cs_clear:N \xeCJK_fallback_punct_symbol:NN
2983     \xeCJK_cs_clear:N \xeCJK_clear_fallback_font:
2984   } ,
2985   AutoFallBack .default:n = { true } ,
2986   fallback .meta:n = { AutoFallBack = true }
2987 }

```

`\xeCJK_fallback_symbol:NN` Test if the current character exists in the current font, if it exists, output it directly, otherwise enable the fallback font.

```

\xeCJK_fallback_punct_symbol:NN
2988 \cs_new_protected:Npn \xeCJK_fallback_symbol:NN #1#2
2989 {
2990   \xeCJK_reset_fallback_font:
2991   \xeCJK_glyph_if_exist:NF #2
2992   { \xeCJK_fallback_symbol_aux:NN }
2993   #1#2
2994 }
2995 \cs_new_protected:Npn \xeCJK_fallback_punct_symbol:NN #1#2
2996 {
2997   \xeCJK_reset_fallback_font:
2998   \xeCJK_glyph_if_exist:NF #2
2999   { \xeCJK_fallback_punct_symbol_aux:NN }
3000   #1#2
3001 }
3002 \cs_new_eq:NN \xeCJK_fallback_symbol:NN \prg_do_nothing:

```

```

3003 \cs_new_eq:NN \xeCJK_fallback_punct_symbol:NN \prg_do_nothing:
3004 \cs_new_protected:Npn \xeCJK_fallback_symbol_aux:NN
3005   {
3006     \xeCJK_fallback_symbol_aux:nnNN
3007     { \CJK@family }
3008     { \l_xeCJK_family_tl }
3009   }
3010 \cs_new_protected:Npn \xeCJK_fallback_punct_symbol_aux:NN
3011   {
3012     \xeCJK_fallback_symbol_aux:nnNN
3013     { \CJK@punctfamily }
3014     { \l_xeCJK_punct_family_tl }
3015   }
3016 \cs_new_protected:Npn \xeCJK_fallback_symbol_aux:nnNN
3017   {
3018     \cs_set_protected:Npx \xeCJK_reset_fallback_font:
3019     {
3020       \tex_the:D \tex_font:D
3021       \xeCJK_clear_fallback_font:
3022     }
3023     \exp_args:Nee \xeCJK_fallback_loop:nnNN
3024   }
3025 \cs_new_protected:Npn \xeCJK_clear_fallback_font:
3026   { \cs_set_eq:NN \xeCJK_reset_fallback_font: \prg_do_nothing: }
3027 \cs_new_eq:NN \xeCJK_reset_fallback_font: \prg_do_nothing:
3028 \cs_new_eq:NN \xeCJK_clear_fallback_font: \prg_do_nothing:

```

`\xeCJK_fallback_loop:nnNN` Loop to test if the `fallbackfont` contains character `#1`. If the character exists in the `fallbackfont` or there is no more `fallbackfont`, the loop will be terminated. If there is no backup font in current font family, use the setting of `\CJKfamilydefault`.

```

3029 \cs_new_protected:Npn \xeCJK_fallback_loop:nnNN
3030   {
3031     \cs_set_eq:NN \xeCJK_fallback_loop:TF \use_i:nn
3032     \xeCJK_fallback_loop:nnnNNN { FallBack }
3033   }
3034 \cs_new_protected:Npn \xeCJK_fallback_loop:nnnNNN #1#2#3
3035   {
3036     \xeCJK_select_fallback_font:nnn {#1} {#2} {#3}
3037     \xeCJK_fallback_loop:TF
3038     { \xeCJK_fallback_loop_aux:nnnNNN }
3039     { \xeCJK_fallback_missing_glyph:nnnNNN }
3040     {#1} {#2} {#3}
3041   }
3042 \cs_new_protected:Npn \xeCJK_fallback_loop_aux:nnnNNN #1#2#3#4#5
3043   {
3044     \xeCJK_glyph_if_exist:NF #5
3045     { \xeCJK_fallback_loop:nnnNN { #1/FallBack } {#2} {#3} }
3046     #4#5
3047   }
3048 \cs_new_protected:Npn \xeCJK_fallback_missing_glyph:nnnNNN #1#2#3#4#5
3049   {
3050     \xeCJK_warning:nxxx { missing-glyph } {#1} {#2} {#5}
3051     #4#5
3052   }
3053 \cs_new_protected:Npn \xeCJK_select_fallback_font:nnn #1#2
3054   {
3055     \xeCJK_select_fallback_font:cnnn
3056     { \xeCJK_font_csname:n { #2/#1 } } {#1} {#2}
3057   }
3058 \cs_new_protected:Npn \xeCJK_select_fallback_font:Nnnn #1
3059   {
3060     \cs_if_exist:NF #1
3061     { \xeCJK_fallback_font_initial:NNnnn }
3062     #1 \use_none:nnn
3063   }
3064 \cs_generate_variant:Nn \xeCJK_select_fallback_font:Nnnn { c }
3065 \cs_new_protected:Npn \xeCJK_fallback_font_initial:NNnnn #1#2#3#4#5

```

```

3066 {
3067   \xeCJK_family_if_exist:nTF { #5/#3 }
3068     { \xeCJK_font_initial:Nn #1 { #5/#3 } }
3069     { \xeCJK_fallback_font_initial_auxi:Nnnn #1 {#5} {#3} {#4} }
3070   #1
3071 }
3072 \cs_new_protected:Npn \xeCJK_fallback_font_initial_auxi:Nnnn #1
3073 {
3074   \exp_args:NNe \xeCJK_fallback_font_initial_auxii:Nnnnn
3075     #1 { \CJKfamilydefault }
3076 }
3077 \cs_new_protected:Npn \xeCJK_fallback_font_initial_auxii:Nnnnn #1#2#3
3078 {
3079   \str_if_eq:nnTF {#2} {#3}
3080     { \xeCJK_fallback_loop_end:Nnnn }
3081     { \xeCJK_fallback_font_initial_auxiii:Nnnn }
3082     #1 {#2}
3083 }
3084 \cs_new_protected:Npn \xeCJK_fallback_font_initial_auxiii:Nnnn #1#2
3085 {
3086   \xeCJK_family_if_exist:nTF {#2}
3087     { \xeCJK_fallback_font_initial_auxiv:Nnnn }
3088     { \xeCJK_fallback_loop_end:Nnnn }
3089     #1 {#2}
3090 }
3091 \cs_new_protected:Npn \xeCJK_fallback_font_initial_auxiv:Nnnn #1#2#3#4
3092 {
3093   \xeCJK_font_initial:Nn #1 {#2}
3094   \exp_args:Nc \xeCJK_fallback_font_initial_auxiii:Nnnn
3095     { \xeCJK_font_csname:n { #4/#3/FallBack } }
3096     { #2/FallBack } { #3/FallBack } { #4}
3097 }
3098 \cs_new_eq:NN \xeCJK_fallback_loop:TF \use_i:nn
3099 \cs_new_protected:Npn \xeCJK_fallback_loop_end:Nnnn #1#2#3#4
3100 { \cs_gset_eq:NN #1 \xeCJK_fallback_loop_end: }
3101 \cs_new_protected:Npn \xeCJK_fallback_loop_end:
3102 { \cs_set_eq:NN \xeCJK_fallback_loop:TF \use_ii:nn }
3103 \xeCJK_msg_new:nn { missing-glyph }
3104 {
3105   CJKfamily~\xeCJK_msg_family_map:n {#2}'~{#1}~
3106   does~not~contain~glyph~`#3'~
3107   ( U + \int_to_Hex:n {`#3} )~\msg_line_context:.
3108 }

```

```

\setCJKfallbackfamilyfont 3109 \NewDocumentCommand \setCJKfallbackfamilyfont { m o m }

```

```

3110 {
3111   \xeCJK_pass_args:nnn
3112     { \xeCJK_set_family_fallback:nnn {#1} } {#2} {#3}
3113     {}
3114 }

```

```

\xeCJK_set_family_fallback:nnn 3115 \cs_new_protected:Npn \xeCJK_set_family_fallback:nnn #1#2#3

```

```

3116 {
3117   \group_begin:
3118   \tl_set:Nn \l_xeCJK_fallback_family_tl {#1}
3119   \prop_get:NoNF \g_xeCJK_family_font_name_prop
3120     \l_xeCJK_fallback_family_tl \l_xeCJK_font_name_tl
3121     { \tl_clear:N \l_xeCJK_font_name_tl }
3122   \clist_set:Nn \l_xeCJK_public_options_clist {#2}
3123   \clist_map_function:nN {#3} \xeCJK_set_family_fallback:n
3124     \group_end:
3125 }
3126 \cs_new_protected:Npn \xeCJK_set_family_fallback:n #1
3127 {
3128   \tl_put_right:Nn \l_xeCJK_fallback_family_tl { /FallBack }
3129   \xeCJK_get_sub_features:on \l_xeCJK_fallback_family_tl {#1}
3130   \clist_concat:NNN \l_xeCJK_sub_font_options_clist
3131     \l_xeCJK_public_options_clist

```

```

3132 \l xeCJK_sub_font_options_clist
3133 \exp_args:Nooo \xeCJK_set_family:nnn
3134 \l xeCJK_fallback_family_tl
3135 \l xeCJK_sub_font_options_clist
3136 \l xeCJK_sub_font_name_tl
3137 }
3138 \tl_new:N \l xeCJK_fallback_family_tl
3139 \clist_new:N \l xeCJK_public_options_clist

```

5.12 CJK font family declaration method

```

3140 \bool_new:N \g xeCJK_auto_fake_bold_bool
3141 \bool_new:N \g xeCJK_auto_fake_slant_bool
3142 \fp_new:N \g xeCJK_embolden_factor_fp
3143 \fp_new:N \g xeCJK_slant_factor_fp

```

Macro package option declaration for **AutoFakeBold** pseudo-bold and pseudo-italic.

```

AutoFakeSlant
EmboldenFactor
SlantFactor
3144 \keys_define:nn { xeCJK / options }
3145 {
3146   AutoFakeBold .choices:nn = { true , false }
3147   { \use:c { bool_gset_ \l_keys_choice_tl :N } \g xeCJK_auto_fake_bold_bool } ,
3148   AutoFakeBold / unknown .code:n =
3149   {
3150     \bool_gset_true:N \g xeCJK_auto_fake_bold_bool
3151     \fp_gset:Nn \g xeCJK_embolden_factor_fp { \l_keys_value_tl }
3152   } ,
3153   AutoFakeBold .default:n = { true } ,
3154   AutoFakeSlant .choices:nn = { true , false }
3155   { \use:c { bool_gset_ \l_keys_choice_tl :N } \g xeCJK_auto_fake_slant_bool } ,
3156   AutoFakeSlant / unknown .code:n =
3157   {
3158     \bool_gset_true:N \g xeCJK_auto_fake_slant_bool
3159     \fp_gset:Nn \g xeCJK_slant_factor_fp { \l_keys_value_tl }
3160   } ,
3161   AutoFakeSlant .default:n = { true } ,
3162   EmboldenFactor .fp_gset:N = \g xeCJK_embolden_factor_fp ,
3163   SlantFactor .fp_gset:N = \g xeCJK_slant_factor_fp ,
3164   BoldFont .meta:n = { AutoFakeBold = true } ,
3165   boldfont .meta:n = { AutoFakeBold = true } ,
3166   SlantFont .meta:n = { AutoFakeSlant = true } ,
3167   slantfont .meta:n = { AutoFakeSlant = true }
3168 }

```

`\xeCJK_new_sub_key:n` is used to define the options of CJK sub-region fonts and alternate fonts.

```

\g xeCJK_sub_key_seq
3169 \seq_new:N \g xeCJK_sub_key_seq
3170 \cs_new_protected:Npn \xeCJK_new_sub_key:n #1
3171 {
3172   \seq_gput_right:Nn \g xeCJK_sub_key_seq {#1}
3173   \keys_define:nn { xeCJK / features }
3174   {
3175     #1 .code:n =
3176     {
3177       \tl_if_blank:nTF {##1}
3178       {
3179         \prop_clear:N \l xeCJK_sub_key_prop
3180         \tl_set:Nx \l xeCJK_sub_family_name_tl
3181         { \l xeCJK_family_name_tl /#1 }
3182         \clist_remove_all:Nn \l xeCJK_font_options_clist {#1}
3183       }
3184       {
3185         \tl_clear:N \l xeCJK_sub_family_name_tl
3186         \str_if_eq:nnTF {##1} { * }
3187         { \prop_put:Nnn \l xeCJK_sub_key_prop {#1} { \q_no_value } }
3188         { \ xeCJK_get_sub_features:nn {#1} {##1} }
3189       }

```

```

3190     },
3191     #1 .default:n = { }
3192   }
3193 }

\ xecjk_get_sub_features:nn 3194 \cs_new_protected:Npn \ xecjk_get_sub_features:nn #1#2
\ xecjk_get_sub_features:w 3195 {
3196   \tl_set:Nx \l xecjk_tmp_tl { \xecjk_tl_remove_outer_braces:n {#2} }
3197   \clist_clear:N \l xecjk_sub_font_options_clist
3198   \exp_after:wN \ xecjk_get_sub_features:w \l xecjk_tmp_tl
3199     \q_mark [ \q_nil ] \q_mark \q_stop
3200   \tl_if_empty:NTF \l xecjk_sub_font_name_tl
3201     { \tl_set_eq:NN \l xecjk_sub_font_name_tl \l xecjk_font_name_tl }
3202     { \tl_replace_all:Nno \l xecjk_sub_font_name_tl { * } \l xecjk_font_name_tl }
3203   \prop_put:Nne \l xecjk_sub_key_prop {#1}
3204     {
3205       { \exp_not:o \l xecjk_sub_font_options_clist }
3206       { \exp_not:o \l xecjk_sub_font_name_tl }
3207     }
3208   }
3209 \cs_new_protected:Npn \ xecjk_get_sub_features:w #1 [#2] #3 \q_mark #4 \q_stop
3210 {
3211   \quark_if_nil:nTF {#2}
3212     { \tl_set_eq:NN \l xecjk_sub_font_name_tl \l xecjk_tmp_tl }
3213     {
3214       \tl_set:Nx \l xecjk_sub_font_name_tl
3215         { \xecjk_tl_remove_outer_braces:n {#3} }
3216       \tl_if_empty:NTF \l xecjk_sub_font_name_tl
3217         { \tl_set_eq:NN \l xecjk_sub_font_name_tl \l xecjk_tmp_tl }
3218         { \clist_set:Nn \l xecjk_sub_font_options_clist {#2} }
3219     }
3220 }
3221 \tl_new:N \l xecjk_sub_family_name_tl
3222 \tl_new:N \l xecjk_sub_font_name_tl
3223 \clist_new:N \l xecjk_sub_font_options_clist
3224 \cs_generate_variant:Nn \ xecjk_get_sub_features:nn { o }
3225 \cs_generate_variant:Nn \tl_replace_all:Nnn { Nno }

```

FallBack 3226 \xecjk_new_sub_key:n { FallBack }

BoldFont calls the property declaration of the font, same as the `fontspec` macro package.

ItalicFont

```

3227 \keys_define:nn { xecjk / features }
3228 {
3229   BoldFont .tl_set:N = \l xecjk_font_name_bf_tl ,
3230   ItalicFont .tl_set:N = \l xecjk_font_name_it_tl
3231 }

```

AutoFakeBold 3232 \keys_define:nn { xecjk / features }

AutoFakeSlant 3233 {

```

3234   AutoFakeBold .choice: ,
3235   AutoFakeBold / true .code:n =
3236     {
3237       \bool_set_true:N \l xecjk_auto_fake_bold_bool
3238       \fp_set_eq:NN \l xecjk_embolden_factor_fp \g xecjk_embolden_factor_fp
3239     } ,
3240   AutoFakeBold / false .code:n =
3241     { \bool_set_false:N \l xecjk_auto_fake_bold_bool } ,
3242   AutoFakeBold / unknown .code:n =
3243     {
3244       \bool_set_true:N \l xecjk_auto_fake_bold_bool
3245       \fp_set:Nn \l xecjk_embolden_factor_fp { \l_keys_value_tl }
3246     } ,
3247   AutoFakeBold .default:n = { true } ,
3248   AutoFakeSlant .voice: ,
3249   AutoFakeSlant / true .code:n =
3250     {

```

```

3251     \bool_set_true:N \l xeCJK_auto_fake_slant_bool
3252     \fp_set_eq:NN \l xeCJK_slant_factor_fp \g xeCJK_slant_factor_fp
3253   } ,
3254   AutoFakeSlant / false .code:n =
3255   { \bool_set_false:N \l xeCJK_auto_fake_slant_bool } , AutoFakeSlant
3256   / unknown .code:n =
3257   {
3258     \bool_set_true:N \l xeCJK_auto_fake_slant_bool
3259     \fp_set:Nn \l xeCJK_slant_factor_fp { \l_keys_value_tl }
3260   } ,
3261   AutoFakeSlant .default:n = { true }
3262 }

```

```

\ xeCJK_set_family_initial: 3263 \cs_new_protected:Npn \ xeCJK_set_family_initial:
3264 {
3265   \int_gincr:N \g xeCJK_family_int
3266   \prop_clear:N \l xeCJK_sub_key_prop
3267   \tl_clear:N \l xeCJK_font_name_bf_tl
3268   \tl_clear:N \l xeCJK_font_name_it_tl
3269   \tl_clear:N \l xeCJK_sub_family_name_tl
3270   \clist_clear:N \l xeCJK_fontspec_options_clist
3271   \bool_set_eq:NN \l xeCJK_auto_fake_bold_bool \g xeCJK_auto_fake_bold_bool
3272   \bool_set_eq:NN \l xeCJK_auto_fake_slant_bool \g xeCJK_auto_fake_slant_bool
3273   \fp_set_eq:NN \l xeCJK_embolden_factor_fp \g xeCJK_embolden_factor_fp
3274   \fp_set_eq:NN \l xeCJK_slant_factor_fp \g xeCJK_slant_factor_fp
3275 }
3276 \int_new:N \g xeCJK_family_int
3277 \prop_new:N \l xeCJK_sub_key_prop
3278 \clist_new:N \l xeCJK_fontspec_options_clist
3279 \bool_new:N \l xeCJK_auto_fake_bold_bool
3280 \bool_new:N \l xeCJK_auto_fake_slant_bool
3281 \fp_new:N \l xeCJK_embolden_factor_fp
3282 \fp_new:N \l xeCJK_slant_factor_fp

```

\xeCJK_set_family:nnnn Set a new CJK font family, similar to \newfontfamily, add FallBack option.

```

3283 \cs_new_protected:Npn \xeCJK_set_family:nnn #1#2#3
3284 {
3285   \group_begin:
3286   \ xeCJK_set_family_initial:
3287   \tl_set:Nn \l xeCJK_family_name_tl {#1}
3288   \clist_set:Nn \l xeCJK_font_options_clist {#2}
3289   \tl_set:Nn \l xeCJK_font_name_tl {#3}
3290   \clist_concat:NNN \l xeCJK_font_options_clist
3291     \g xeCJK_default_features_clist \l xeCJK_font_options_clist
3292   \keys_set_known:noN { xeCJK / features }
3293     \l xeCJK_font_options_clist \l xeCJK_fontspec_options_clist
3294   \ xeCJK_binding_sub_family:
3295   \ xeCJK_parse_font_shape:
3296   \ xeCJK_check_family:o \l xeCJK_family_name_tl
3297   \ xeCJK_gset_family_cs:n { \l xeCJK_family_name_tl }
3298   \ xeCJK_save_family_info:
3299   \ xeCJK_set_sub_block_family:
3300   \group_end:
3301 }
3302 \tl_new:N \l xeCJK_family_name_tl
3303 \tl_new:N \l xeCJK_font_name_tl
3304 \clist_new:N \l xeCJK_font_options_clist
3305 \cs_generate_variant:Nn \xeCJK_set_family:nnn { e , o }

```

```

\ xeCJK_binding_sub_family: 3306 \cs_new_protected:Npn \ xeCJK_binding_sub_family:
3307 {
3308   \tl_if_empty:NF \l xeCJK_sub_family_name_tl
3309   { \tl_set_eq:NN \l xeCJK_family_name_tl \l xeCJK_sub_family_name_tl }
3310 }

```

```

\ xeCJK_gset_family_cs:n 3311 \cs_new_protected:Npn \ xeCJK_gset_family_cs:n #1
3312 {

```



```

3313 \cs_gset_protected:cpx { \ xeCJK_family_csname:n {#1} }
3314 {
3315   \group_begin:
3316   \exp_not:n { \cs_set_eq:NN \xeCJK@fontfamily \use_none:n }
3317   \exp_not:n { \fontspec_gset_family:Nnn \g xeCJK_fontspec_family_tl }
3318   { \exp_not:o \l xeCJK_fontspec_options_clist }
3319   { \exp_not:o \l xeCJK_font_name_tl }
3320   \ xeCJK_gset_family_nfss_cs:no
3321   {#1} { \exp_not:N \g xeCJK_fontspec_family_tl }
3322   \group_end:
3323   \tl_set_eq:NN \exp_not:N \l xeCJK_fontspec_family_tl
3324   \exp_not:N \g xeCJK_fontspec_family_tl
3325 }
3326 }
3327 \tl_new:N \g xeCJK_fontspec_family_tl
3328 \tl_new:N \l xeCJK_fontspec_family_tl

```

```

\ xeCJK_check_family:n 3329 \cs_new_protected:Npn \ xeCJK_check_family:n #1
3330 {
3331   \prop_gpop:NnNT \g xeCJK_family_font_name_prop {#1} \l xeCJK_tmp_tl
3332   {
3333     \prop_gpop:NnNT \g xeCJK_family_name_prop {#1} \l xeCJK_tmp_tl
3334     {
3335       \cs_undefine:c { \ xeCJK_family_csname:n {#1} }
3336       \cs_undefine:c { \ xeCJK_family_nfss_csname:n {#1} }
3337     }
3338     \ xeCJK_warning:nxx {CJKfamily-redef} {#1} { \l xeCJK_tmp_tl }
3339   }
3340 }
3341 \cs_generate_variant:Nn \ xeCJK_check_family:n { o }
3342 \ xeCJK_msg_new:nn { CJKfamily-redef }
3343 { Redefining~CJKfamily~\ xeCJK_msg_family_map:n {#1}'~{#2}. }

```

```

\ xeCJK_parse_font_shape: 3344 \cs_new_protected:Npn \ xeCJK_parse_font_shape:
3345 {
3346   \tl_if_blank:oTF \l xeCJK_font_name_bf_tl
3347   {
3348     \bool_if:NT \l xeCJK_auto_fake_bold_bool
3349     {
3350       \clist_put_right:Nx \l xeCJK_fontspec_options_clist
3351       { AutoFakeBold = { \fp_use:N \l xeCJK_embolden_factor_fp } }
3352     }
3353   }
3354   {
3355     \clist_put_right:Nx \l xeCJK_fontspec_options_clist
3356     { BoldFont = { \exp_not:o \l xeCJK_font_name_bf_tl } }
3357   }
3358   \tl_if_blank:oTF \l xeCJK_font_name_it_tl
3359   {
3360     \bool_if:NT \l xeCJK_auto_fake_slant_bool
3361     {
3362       \clist_put_right:Nx \l xeCJK_fontspec_options_clist
3363       { AutoFakeSlant = { \fp_use:N \l xeCJK_slant_factor_fp } }
3364     }
3365   }
3366   {
3367     \clist_put_right:Nx \l xeCJK_fontspec_options_clist
3368     { ItalicFont = { \exp_not:o \l xeCJK_font_name_it_tl } }
3369   }
3370 }

```

```

\g xeCJK_family_name_prop 3371 \prop_new:N \g xeCJK_family_name_prop
\g xeCJK_family_font_name_prop 3372 \prop_new:N \g xeCJK_family_font_name_prop
\g xeCJK_family_font_options_prop 3373 \prop_new:N \g xeCJK_family_font_options_prop

```

```

\ xeCJK_save_family_info: 3374 \cs_new_protected:Npn \ xeCJK_save_family_info:
3375 {
3376   \exp_args:Nooo \ xeCJK_save_family_info:nnn

```

```

3377     \l xeCJK_family_name_tl
3378     \l xeCJK_font_name_tl
3379     \l xeCJK_font_options_clist
3380   }
3381 \cs_new_protected:Npn \ xeCJK_save_family_info:nnn #1#2#3
3382 {
3383   \prop_gput:Nnn \g xeCJK_family_font_name_prop      {#1} {#2}
3384   \prop_gput:Nnn \g xeCJK_family_font_options_prop {#1} {#3}
3385 }

\ xeCJK_set_sub_block_family: 3386 \cs_new_protected:Npn \ xeCJK_set_sub_block_family:
3387 {
3388   \prop_if_empty:NF \l xeCJK_sub_key_prop
3389   {
3390     \prop_map_function:NN
3391     \l xeCJK_sub_key_prop
3392     \ xeCJK_set_sub_block_family:nn
3393   }
3394 }
3395 \cs_new_protected:Npn \ xeCJK_set_sub_block_family:nn #1#2
3396 {
3397   \tl_set:Nx \l xeCJK_sub_family_name_tl { \l xeCJK_family_name_tl/#1 }
3398   \quark_if_no_value:nTF {#2}
3399   { \ xeCJK_copy_sub_family:n {#1} }
3400   { \ xeCJK_set_family:onn \l xeCJK_sub_family_name_tl #2 }
3401 }
3402 \cs_new_protected:Npn \ xeCJK_copy_sub_family:n #1
3403 {
3404   \ xeCJK_check_family:o \l xeCJK_sub_family_name_tl
3405   \prop_get:NoNT \g xeCJK_family_font_name_prop
3406   \l xeCJK_family_name_tl \l xeCJK_sub_font_name_tl
3407   {
3408     \prop_gput:Noo \g xeCJK_family_font_name_prop
3409     \l xeCJK_sub_family_name_tl \l xeCJK_sub_font_name_tl
3410   }
3411   \prop_get:NoNT \g xeCJK_family_font_options_prop
3412   \l xeCJK_family_name_tl \l xeCJK_sub_font_options_clist
3413   {
3414     \clist_remove_all:Nn \l xeCJK_sub_font_options_clist { #1 = * }
3415     \prop_gput:Noo \g xeCJK_family_font_options_prop
3416     \l xeCJK_sub_family_name_tl \l xeCJK_sub_font_options_clist
3417   }
3418   \cs_gset_protected:cpX
3419   { \ xeCJK_family_csname:n { \l xeCJK_sub_family_name_tl }
3420   {
3421     \ xeCJK_family_if_exist:eT { \l xeCJK_family_name_tl }
3422     {
3423       \ xeCJK_gset_family_nfss_cs:no
3424       { \l xeCJK_sub_family_name_tl }
3425       { \exp_not:N \l xeCJK_fontspeg_family_tl }
3426     }
3427   }
3428 }

```

```

\ xeCJK_copy_family:nn 3429 \cs_new_protected:Npn \ xeCJK_copy_family:nn #1#2
\ xeCJK_copy_family:ee 3430 {
3431   \ xeCJK_family_if_exist:nT {#2}
3432   {
3433     \prop_gput:Nno \g xeCJK_family_name_prop
3434     {#1} \l xeCJK_fontspeg_family_tl
3435     \tl_map_inline:nn
3436     {
3437       \g xeCJK_family_font_name_prop
3438       \g xeCJK_family_font_options_prop
3439     }
3440     {
3441       \prop_get:NnNT ##1 {#2} \l xeCJK_tmp_tl
3442       { \prop_gput:Nno ##1 {#1} \l xeCJK_tmp_tl }

```

```

3443     }
3444     \cs_gset_eq:cc
3445     { \xeCJK_family_nfss_csname:n {#1} }
3446     { \xeCJK_family_nfss_csname:n {#2} }
3447   }
3448 }
3449 \cs_generate_variant:Nn \xeCJK_copy_family:nn { ee }

```

5.13 Font switching

`\xeCJK_select_font:` Cache the original format of current font to speed up the compilation.
`\l_xeCJK_current_font_tl`

```

3450 \cs_new:Npn \xeCJK_font_csname:n #1
3451   { \xeCJK/#1/\f@series/\f@shape/\f@size }
3452 \tl_new:N \l_xeCJK_current_font_tl
3453 \tl_set:No \l_xeCJK_current_font_tl
3454   { \xeCJK_font_csname:n { \CJK@family } }
3455 \cs_new_protected:Npn \xeCJK_select_font:
3456   {
3457     \xeCJK_select_font:cn
3458     { \l_xeCJK_current_font_tl }
3459     { \l_xeCJK_family_tl }
3460   }
3461 \cs_new_protected:Npn \xeCJK_select_font:Nn #1#2
3462   {
3463     \xeCJK_clear_fallback_font:
3464     \cs_if_exist:NF #1 { \xeCJK_font_initial:Nn #1 {#2} }
3465     #1
3466   }
3467 \cs_generate_variant:Nn \xeCJK_select_font:Nn { c }
3468 \tl_new:N \l_xeCJK_current_coor_tl
3469 \cs_new_eq:NN \xeCJK@setfont \xeCJK_select_font:

```

`\xeCJK_font_initial:Nn` Note that `\selectfont` should be called in a group to prevent the font parameters such as `\f@series` from being modified, which will cause the `\l_xeCJK_current_font_tl` tag to be inconsistent and lead to `err` (see [#486](#))

```

3470 \cs_new_protected:Npn \xeCJK_font_initial:Nn #1#2
3471   {
3472     \group_begin:
3473     \xeCJK_font_initial_hook:
3474     \xeCJK_family_use:n {#2}
3475     \xeCJK_font_gset_to_current:N #1
3476     \group_end:
3477   }
3478 \cs_new_protected:Npn \xeCJK_font_initial_hook:
3479   { \tl_use:N \g_xeCJK_font_initial_hook_tl }
3480 \cs_new_protected:Npn \xeCJK_gadd_font_initial_hook:n
3481   { \tl_gput_right:Nn \g_xeCJK_font_initial_hook_tl } 3482
\l_xeCJK_font_initial_hook_tl

```

`\xeCJK_select_punct_font:` Switch the punctuation font.
`\l_xeCJK_current_punct_font_tl`

```

3483 \cs_new_eq:NN \xeCJK_select_punct_font: \xeCJK_select_font:
3484 \cs_new_protected:Npn \xeCJK_select_punct_font_aux:
3485   {
3486     \xeCJK_select_font:cn
3487     { \l_xeCJK_current_punct_font_tl }
3488     { \l_xeCJK_punct_family_tl }
3489   }
3490 \tl_new:N \CJK@punctfamily
3491 \tl_new:N \l_xeCJK_punct_family_tl
3492 \tl_new:N \l_xeCJK_current_punct_font_tl
3493 \tl_set:Nn \CJK@punctfamily { \CJK@family }
3494 \tl_set:Nn \l_xeCJK_punct_family_tl { \l_xeCJK_family_tl }
3495 \tl_set:No \l_xeCJK_current_punct_font_tl
3496   { \xeCJK_font_csname:n { \CJK@punctfamily } }

```

```

3497 \cs_new_eq:NN \xeCJK_select_font: \prg_do_nothing:
3498 \cs_new_eq:NN \xeCJK_select_punct_font: \prg_do_nothing:

```

`\xeCJK_switch_font:nn` Switch the font between two CJK partitions.

```

3499 \cs_new_protected:Npn \xeCJK_switch_font:nn #1#2
3500 {
3501   \str_if_eq:nnF {#1} {#2}
3502   {
3503     \xeCJK_info:nxx {CJK-block} {#1} {#2}
3504     \str_if_eq:nnTF {#2} {CJK}
3505     { \xeCJK_select_font: }
3506     { \xeCJK_select_font:n {#2} }
3507   }
3508 }
3509 \xeCJK_msg_new:nn {CJK-block} {Switch~from~block~`#1'~to~`#2'.}

```

`\xeCJK_select_font:n` If the current CJK font family does not define the font of subpartition #1, the corresponding partition font of `\CJKfamilydefault` will be used.

`\xeCJK_block_family:nn` If `\CJKfamilydefault` does not define this partition font either, the main partition font of the current CJK font family will be used.

```

3510 \cs_new_protected:Npn \xeCJK_select_font:n #1
3511 {
3512   \xeCJK_select_font:cnn
3513   { \xeCJK_font_csname:n { \CJK@family/#1 } }
3514   { \lxeCJK_family_tl }
3515   {#1}
3516 }
3517 \cs_new_protected:Npn \xeCJK_select_font:Nnn #1#2#3
3518 {
3519   \xeCJK_clear_fallback_font:
3520   \cs_if_exist:NF #1
3521   { \xeCJK_block_font_initial:Nnn #1 {#2} {#3} }
3522   #1
3523 }
3524 \cs_generate_variant:Nn \xeCJK_select_font:Nnn {c}
3525 \cs_new_protected:Npn \xeCJK_block_font_initial:Nnn #1#2#3
3526 {
3527   \xeCJK_block_family:nn {#2} {#3}
3528   \xeCJK_font_initial:Nn #1 {#2/#3}
3529 }
3530 \cs_new_protected:Npn \xeCJK_block_family:nn #1#2
3531 {
3532   \xeCJK_family_if_exist:eF {#1/#2}
3533   {
3534     \xeCJK_copy_family:ee {#1/#2}
3535     {
3536       \cs_if_exist:cTF
3537       { \xeCJK_family_csname:n { \CJKfamilydefault/#2 } }
3538       { \CJKfamilydefault/#2 } {#1}
3539     }
3540   }
3541 }

```

```

\xeCJK_family_csname:n 3542 \cs_new:Npn \xeCJK_family_csname:n #1
\xeCJK_family_nfss_csname:n 3543 { \xeCJK/family/#1 }
\xeCJK_family_use:n 3544 \cs_new:Npn \xeCJK_family_nfss_csname:n #1
\xeCJK_gset_family_nfss_cs:nn 3545 { \xeCJK/family/nfss/#1 }
3546 \cs_new_protected:Npn \xeCJK_family_use:n #1
3547 { \use:c { \xeCJK_family_nfss_csname:n {#1} } }
3548 \cs_new_protected:Npn \xeCJK_gset_family_nfss_cs:nn #1#2
3549 {
3550   \prop_gput:Nnn \gxeCJK_family_name_prop {#1} {#2}
3551   \cs_gset_protected:cpx
3552   { \xeCJK_family_nfss_csname:n {#1} }
3553   { \xeCJK_nfss_family:nn { \cxeCJK_encoding_tl } {#2} }
3554 }
3555 \cs_generate_variant:Nn \xeCJK_gset_family_nfss_cs:nn {no}

```

`\xeCJK_nfss_family:n` is used to handle problems that may be caused by inconsistencies between `\bfseries@rm`, etc. and `\bfdefault` in LATEX 2_ε 2020/02/02.

```

3556 \cs_if_exist:NTF \fontseriesforce
3557   {
3558     \cs_new_protected:Npn \xeCJK_nfss_family:nn #1#2
3559     {
3560       \fontencoding {#1}
3561       \str_if_eq:eeF { \f@series } { \bfdefault }
3562       {
3563         \str_case_e:nn { \f@family }
3564         {
3565           { \rmdefault } { \xeCJK_nfss_series:n { rm } }
3566           { \sfdefault } { \xeCJK_nfss_series:n { sf } }
3567           { \ttdefault } { \xeCJK_nfss_series:n { tt } }
3568         }
3569       }
3570       \fontfamily {#2}
3571       \selectfont
3572     }
3573     \cs_new_protected:Npn \xeCJK_nfss_series:n #1
3574     {
3575       \str_if_eq:eeT { \f@series } { \use:c { bfseries@#1 } }
3576       { \fontseriesforce { \bfdefault } }
3577     }
3578   }
3579   {
3580     \cs_new_protected:Npn \xeCJK_nfss_family:nn #1#2
3581     {
3582       \fontencoding {#1}
3583       \tl_set:Nn \f@family {#2}
3584       \selectfont
3585     }
3586   }

```

```

\xeCJK_family_if_exist:n TF 3587 \prg_new_protected_conditional:Npnn \xeCJK_family_if_exist:n #1 { T , F , TF }
3588   {
3589     \prop_get:NnNTF \g xeCJK_family_name_prop
3590     {#1} \l xeCJK_fontspec_family_tl
3591     { \prg_return_true: }
3592     {
3593       \exp_args:Ne \cs_if_exist_use:cTF
3594       { \xeCJK_family_csname:n {#1} }
3595       { \prg_return_true: }
3596       { \prg_return_false: }
3597     }
3598   }
3599 \prg_generate_conditional_variant:Nnn \xeCJK_family_if_exist:n { e } { T , F , TF }

```

`\CJKfamily` is used to switch the CJK font family.

```

3600 \NewDocumentCommand \CJKfamily { t+ t- m }
3601   {
3602     \xeCJK_family:NNe #1 #2 {#3}
3603     \tex_ignorespaces:D
3604   }
3605 \cs_new_protected:Npn \xeCJK_family:NNNn #1#2#3
3606   {
3607     \tl_if_blank:nTF {#3}
3608     {
3609       \bool_if:NF #1 { \bool_if:NF #2 { \use_none:nn } }
3610       \xeCJK_family_if_exist_use:e { \l xeCJK_family_tl }
3611     }
3612     {
3613       \bool_if:NTF #2
3614       { \xeCJK_family_if_exist_use:n {#3} }
3615       {
3616         \xeCJK_family_if_exist:nTF {#3}
3617         {

```

```

3618         \tl_set:Nn \l_xeCJK_family_tl {#3}
3619         \tl_set_eq:NN \CJK@family \l_xeCJK_fontspec_family_tl
3620         \bool_if:NT #1 { \xeCJK_family_use:n {#3} }
3621     }
3622     { \xeCJK_family_unknown_warning:n {#3} }
3623 }
3624 }
3625 }
3626 \cs_generate_variant:Nn \xeCJK_family:NNn { NNe }
3627 \cs_new_protected:Npn \xeCJK_switch_family:n #1
3628 {
3629     \xeCJK_family_if_exist:nTF {#1}
3630     {
3631         \tl_set:Nn \l_xeCJK_family_tl {#1}
3632         \tl_set_eq:NN \CJK@family \l_xeCJK_fontspec_family_tl
3633     }
3634     { \xeCJK_family_unknown_warning:n {#1} }
3635 }
3636 \cs_generate_variant:Nn \xeCJK_switch_family:n { e , o }

```

PunctFamily sets the font for Chinese punctuation.

```

3637 \keys_define:nn { xeCJK / options }
3638 {
3639     PunctFamily .choice: ,
3640     PunctFamily .value_required:n = { true } ,
3641     PunctFamily / false .code:n =
3642     {
3643         \tl_set:Nn \CJK@punctfamily { \CJK@family }
3644         \tl_set:Nn \l_xeCJK_punct_family_tl { \l_xeCJK_family_tl }
3645         \xeCJK_cs_clear:N \xeCJK_select_font:
3646         \xeCJK_cs_clear:N \xeCJK_select_punct_font:
3647         \cs_set_eq:NN \xeCJK_select_punct_font: \xeCJK_select_font:
3648     } ,
3649     PunctFamily / unknown.code:n =
3650     { \xeCJK_punct_family:e {#1} } ,
3651 }
3652 \cs_new_protected:Npn \xeCJK_punct_family:n #1
3653 {
3654     \xeCJK_family_if_exist:nTF {#1}
3655     {
3656         \tl_set:Nn \l_xeCJK_punct_family_tl {#1}
3657         \tl_set_eq:NN \CJK@punctfamily \l_xeCJK_fontspec_family_tl
3658         \cs_set_eq:NN \xeCJK_select_font: \xeCJK_select_font:
3659         \cs_set_eq:NN \xeCJK_select_punct_font: \xeCJK_select_punct_font_aux:
3660         \cs_set_eq:NN \xeCJK_select_punct_font: \xeCJK_select_punct_font:
3661     }
3662     { \xeCJK_family_unknown_warning:n {#1} }
3663 }
3664 \cs_generate_variant:Nn \xeCJK_punct_family:n { e }

```

`\l_xeCJK_family_tl` is used to save the CJK font family currently in use by the document.

```
3665 \tl_new:N \l_xeCJK_family_tl
```

`\CJK@family` is used to save the actual font family name.

```
3666 \tl_new:N \CJK@family
```

```

\xeCJK_gobble_CJKfamily: 3667 \cs_new_protected:Npn \xeCJK_gobble_CJKfamily:
3668     { \cs_set_eq:NN \CJKfamily \xeCJK_gobble_CJKfamily:wn }
3669 \NewExpandableDocumentCommand \xeCJK_gobble_CJKfamily:wn { t+ t- m } {}
\xeCJK_family_if_exist_use:n 3670 \cs_new_protected:Npn \xeCJK_family_if_exist_use:n #1
3671     {
3672         \xeCJK_family_if_exist:nTF {#1}
3673         { \xeCJK_family_use:n {#1} }
3674         { \xeCJK_family_unknown_warning:n {#1} }
3675     }
3676 \cs_generate_variant:Nn \xeCJK_family_if_exist_use:n { e }

```

```

\XeCJK_family_unknown_warning:n 3677 \cs_new_protected:Npn \XeCJK_family_unknown_warning:n #1
3678 {
3679   \prop_if_empty:NF \g_xeCJK_family_font_name_prop
3680   {
3681     \seq_if_in:NnF \g_xeCJK_unknown_family_seq {#1}
3682     {
3683       \seq_gput_right:Nn \g_xeCJK_unknown_family_seq {#1}
3684       \XeCJK_warning:nx {CJKfamily-Unknown} {#1}
3685     }
3686   }
3687 }
3688 \seq_new:N \g_xeCJK_unknown_family_seq
3689 \XeCJK_msg_new:nn {CJKfamily-Unknown}
3690 {
3691   Unknown~CJK~family~\XeCJK_msg_family_map:n {#1}'~is~being~ignored.\\\
3692   Try~to~use~\XeCJK_msg_def_family_map:n {#1}'~to~define~it.
3693 }
3694 \cs_new:Npn \XeCJK_msg_def_family_map:n #1
3695 {
3696   \str_case_e:nnF {#1}
3697   {
3698     \CJKrmdefault { \token_to_str:N \setCJKmainfont }
3699     \CJKsfdefault { \token_to_str:N \setCJKsansfont }
3700     \CJKttdefault { \token_to_str:N \setCJKmonofont }
3701   }
3702   { \token_to_str:N \setCJKfamilyfont \{ #1 \} }
3703   [<... >]\{<... >\}
3704 }
3705 \cs_new:Npn \XeCJK_msg_family_map:n #1
3706 {
3707   \str_case_e:nnF {#1}
3708   {
3709     \CJKrmdefault { \token_to_str:N \CJKrmdefault }
3710     \CJKsfdefault { \token_to_str:N \CJKsfdefault }
3711     \CJKttdefault { \token_to_str:N \CJKttdefault }
3712   }
3713   {#1}
3714 }

```

`\XeCJK_pass_args:nnnn` In order to support two syntaxes of font attribute optional before and after, two helpers are given, similar to the implementation of `fontspec`. It comes with `expand` function, and the extra parameter `#4` is used for post-processing.

```

3715 \cs_new_protected:Npn \XeCJK_pass_args:nnnn #1#2#3#4
3716 {
3717   \tl_if_novalue:nTF {#2}
3718   { \XeCJK_post_arg:w {#1} {#3} {#4} }
3719   {
3720     \use:e { #1 {#2} {#3} }
3721     #4
3722   }
3723 }
3724 \NewDocumentCommand \XeCJK_post_arg:w { m m m O {} }
3725 {
3726   \use:e { #1 {#4} {#2} }
3727   #3
3728 }

```

`\setCJKmainfont` sets the CJK normal, sans-serif and equal-width fonts of the document.

`\setCJKsansfont` 3729 `\NewDocumentCommand \setCJKmainfont { o m }`

```

\setCJKmonofont 3730 {
3731   \XeCJK_pass_args:nnn
3732   { \XeCJK_set_family:nnn { \CJKrmdefault } } {#1} {#2}
3733   { \XeCJK_preamble_family:n { \CJKrmdefault } }
3734 }
3735 \cs_new_eq:NN \setCJKromanfont \setCJKmainfont
3736 \NewDocumentCommand \setCJKsansfont { o m } 3737
{

```

```

3738 \xeCJK_pass_args:nnn
3739 { \xeCJK_set_family:nnn { \CJKsfdefault } } {#1} {#2}
3740 { \xeCJK_preamble_family:n { \CJKsfdefault } }
3741 }
3742 \NewDocumentCommand \setCJKmonofont { o m }
3743 {
3744 \xeCJK_pass_args:nnn
3745 { \xeCJK_set_family:nnn { \CJKttdefault } } {#1} {#2}
3746 { \xeCJK_preamble_family:n { \CJKttdefault } }
3747 }

3748 \@onlypreamble \setCJKmainfont
3749 \@onlypreamble \setCJKmathfont
3750 \@onlypreamble \setCJKsansfont
3751 \@onlypreamble \setCJKmonofont
3752 \@onlypreamble \setCJKromanfont

```

`\xeCJK_preamble_family:n` is used after the main command like `\setCJKmainfont` to make sure there are CJK fonts available in the introductory area.

```

3753 \cs_new_protected:Npn \xeCJK_preamble_family:n #1
3754 { \str_if_eq:eeT {#1} { \CJKfamilydefault } { \normalfont } }

```

`\setCJKfamilyfont` is used to pre-declare CJK font family and declare and call CJK font family immediately, ~~has `\setCJKfontfamily`.~~

```

\CJKfontspec 3755 \NewDocumentCommand \setCJKfamilyfont { m o m }
3756 {
3757 \xeCJK_pass_args:nnn
3758 { \xeCJK_set_family:nnn {#1} } {#2} {#3}
3759 {}
3760 }
3761 \NewDocumentCommand \newCJKfontfamily { o m o m }
3762 {
3763 \tl_set:Nx \l_xeCJK_tmp_tl
3764 { \tl_if_novalue:nTF {#1} { \cs_to_str:N #2 } {#1} }
3765 \cs_new_protected:Npx #2
3766 { \xeCJK_switch_family:n { \l_xeCJK_tmp_tl } }
3767 \xeCJK_pass_args:nnn
3768 { \xeCJK_set_family:nnn { \l_xeCJK_tmp_tl } } {#3} {#4}
3769 {}
3770 }
3771 \NewDocumentCommand \CJKfontspec { o m }
3772 {
3773 \xeCJK_pass_args:nnn
3774 { \xeCJK_fontspec:nn } {#1} {#2}
3775 { \tex_ignorespaces:D }
3776 }

```

```

\xeCJK_fontspec:nn 3777 \cs_new_protected:Npn \xeCJK_fontspec:nn #1#2
3778 {
3779 \prop_get:NnNTF \g_xeCJK_fontspec_prop
3780 { CJKfontspec/#1/#2/id } \l_xeCJK_family_tl
3781 { \xeCJK_switch_family:o { \l_xeCJK_family_tl } }
3782 {
3783 \xeCJK_fontspec:enn
3784 { CJKfontspec ( \int_eval:n { \g_xeCJK_family_int + 1 } ) }
3785 {#1} {#2}
3786 }
3787 }
3788 \cs_new_protected:Npn \xeCJK_fontspec:nnn #1#2#3
3789 {
3790 \prop_gput:Nnn \g_xeCJK_fontspec_prop { CJKfontspec/#2/#3/id } {#1}
3791 \xeCJK_set_family:nnn {#1} {#2} {#3}
3792 \xeCJK_switch_family:n {#1}
3793 }
3794 \cs_generate_variant:Nn \xeCJK_fontspec:nn { oo } 3795
\cs_generate_variant:Nn \xeCJK_fontspec:nnn { e } 3796
\prop_new:N \g_xeCJK_fontspec_prop

```


`\defaultCJKfontfeatures` are used to set the default properties of CJK fonts and add the properties of current CJK fonts, respectively.

```

3797 \clist_new:N \g xeCJK_default_features_clist
3798 \NewDocumentCommand \defaultCJKfontfeatures { m }
3799   { \clist_gset:Nn \g xeCJK_default_features_clist {#1} }
3800 \@onlypreamble \defaultCJKfontfeatures
3801 \NewDocumentCommand \addCJKfontfeatures { s O {} m }
3802   {
3803     \xeCJK_add_font_features:Nee #1 {#2} {#3}
3804     \tex_ignorespaces:D
3805   }
3806 \cs_new_eq:NN \addCJKfontfeature \addCJKfontfeatures

\xeCJK_add_font_features:Nnn 3807 \cs_new_protected:Npn \xeCJK_add_font_features:Nnn #1#2#3
3808   {
3809     \prop_get:NoNTF \g xeCJK_family_font_name_prop
3810     \l_xeCJK_family_tl \l_xeCJK_font_name_tl
3811     {
3812       \clist_set:Nn \l_xeCJK_add_font_features_clist {#3}
3813       \seq_map_inline:Nn \g xeCJK_sub_key_seq
3814         { \clist_remove_all:Nn \l_xeCJK_add_font_features_clist {##1} }
3815       \seq_clear:N \l_xeCJK_sub_key_seq
3816       \clist_clear:N \l_xeCJK_add_block_features_clist
3817       \clist_map_function:nN {#2} \xeCJK_add_sub_features:n
3818       \bool_lazy_and:nnT
3819         {#1}
3820         { \seq_if_empty_p:N \l_xeCJK_sub_key_seq }
3821       {
3822         \seq_map_function:NN
3823         \g xeCJK_sub_key_seq \xeCJK_add_sub_class_features:n
3824       }
3825     \prop_get:NoNT \g xeCJK_family_font_options_prop
3826     \l_xeCJK_family_tl \l_xeCJK_font_options_clist
3827     {
3828       \bool_lazy_or:nnT
3829         { \seq_if_empty_p:N \l_xeCJK_sub_key_seq }
3830         {#1}
3831       {
3832         \clist_concat:NNN \l_xeCJK_font_options_clist
3833         \l_xeCJK_font_options_clist \l_xeCJK_add_font_features_clist
3834       }
3835     \clist_concat:NNN \l_xeCJK_font_options_clist
3836     \l_xeCJK_font_options_clist \l_xeCJK_add_block_features_clist
3837   }
3838   \xeCJK_fontspec:oo \l_xeCJK_font_options_clist \l_xeCJK_font_name_tl
3839   }
3840   { \xeCJK_warning:n { addCJKfontfeature-ignored } }
3841 }
3842 \cs_new_protected:Npn \xeCJK_add_sub_features:n #1
3843   {
3844     \seq_if_in:NnTF \g xeCJK_sub_key_seq {#1}
3845     {
3846       \seq_put_right:Nn \l_xeCJK_sub_key_seq {#1}
3847       \xeCJK_add_sub_class_features:n {#1}
3848     }
3849     { \xeCJK_warning:nx { SubBlock-undefined } {#1} }
3850   }
3851 \clist_new:N \l_xeCJK_add_font_features_clist
3852 \clist_new:N \l_xeCJK_add_block_features_clist
3853 \cs_generate_variant:Nn \xeCJK_add_font_features:Nnn { Nee , Nne }
3854 \xeCJK_msg_new:nn { addCJKfontfeature-ignored }
3855   {
3856     \token_to_str:N \addCJKfontfeature (s)~ignored.\\
3857     It~cannot~be~used~with~a~font~that~wasn't~selected~by~xeCJK.
3858   }

```

```

\xeCJK_add_sub_class_features:n 3859 \cs_new_protected:Npn \xeCJK_add_sub_class_features:n #1
3860   {

```

```

3861 \prop_get:NoNTF \g xeCJK_family_font_name_prop
3862 { \l_xeCJK_family_tl/#1 } \l xeCJK_sub_font_name_tl
3863 {
3864   \prop_get:NoN \g xeCJK_family_font_options_prop
3865   { \l_xeCJK_family_tl/#1 } \l xeCJK_sub_font_options_clist
3866 }
3867 {
3868   \prop_get:NeNTF \g xeCJK_family_font_name_prop
3869   { \CJKfamilydefault/#1 } \l xeCJK_sub_font_name_tl
3870   {
3871     \prop_get:NeN \g xeCJK_family_font_options_prop
3872     { \CJKfamilydefault/#1 } \l xeCJK_sub_font_options_clist
3873   }
3874   {
3875     \prop_get:NoN \g xeCJK_family_font_options_prop
3876     \l_xeCJK_family_tl \l xeCJK_sub_font_options_clist
3877     \tl_set_eq:NN \l xeCJK_sub_font_name_tl \l xeCJK_font_name_tl
3878   }
3879 }
3880 \clist_concat:NNN \l xeCJK_sub_font_options_clist
3881 \l xeCJK_sub_font_options_clist \l xeCJK_add_font_features_clist
3882 \clist_put_right:Nx \l xeCJK_add_block_features_clist
3883 {
3884   #1 =
3885   {
3886     [ \exp_not:o \l xeCJK_sub_font_options_clist ]
3887     { \exp_not:o \l xeCJK_sub_font_name_tl }
3888   }
3889 }
3890 }
3891 \cs_generate_variant:Nn \prop_get:NnN { Ne }
3892 \prg_generate_conditional_variant:Nnn \prop_get:NnN { Ne } { T , TF }

LoadFandol 3893 \keys_define:nn { xeCJK / options }
3894   { LoadFandol .bool_gset:N = \g xeCJK_fandol_bool }
3895 \cs_new_protected:Npn \ xeCJK_load_fandol:
3896 {
3897   \xeCJK_set_family:enn { \CJKrmdefault }
3898   { Extension = .otf , BoldFont = FandolSong-Bold , ItalicFont = FandolKai-Regular }
3899   { FandolSong-Regular }
3900   \xeCJK_set_family:enn { \CJKsfdefault }
3901   { Extension = .otf , BoldFont = FandolHei-Bold } { FandolHei-Regular }
3902   \xeCJK_set_family:enn { \CJKttdefault }
3903   { Extension = .otf } { FandolFang-Regular }
3904 }

```

At the end of the introductory area, if no CJK font is declared a warning is given. If `\CJKfamilydefault` has not been changed, `\CJKfamilydefault` is updated at this point according to the western font, and if the font family corresponding to `\CJKfamilydefault` is not defined, `\CJKrmdefault` is used as the default font family. If `\CJKrmdefault` is also not defined, the first CJK font set in the introductory area is used as the default font family. Finally, set the math font.

```

3905 \xeCJK_at_end_preamble:n
3906 {
3907   \tl_if_eq:NNT \CJKfamilydefault \l xeCJK_family_default_init_tl
3908   {
3909     \group_begin:
3910     \cs_set_eq:NN \ xeCJK_family_default_wrap:n \exp_not:n
3911     \tl_gset:Nx \CJKfamilydefault
3912     {
3913       \str_case:onF { \familydefault }
3914       {
3915         { \rmdefault } { \exp_not:N \CJKrmdefault }
3916         { \sfdefault } { \exp_not:N \CJKsfdefault }
3917         { \ttdefault } { \exp_not:N \CJKttdefault }
3918       }
3919       { \CJKfamilydefault }

```



```

3921     \group_end:
3922     }
3923     \prop_if_empty:NTF \g xeCJK_family_font_name_prop
3924     {
3925         \bool_if:NTF \g xeCJK_fandol_bool
3926         {
3927             \ xeCJK_warning:n { fandol }
3928             \ xeCJK_load_fandol:
3929             \xeCJK_ensure_default_family:
3930         }
3931         { \ xeCJK_warning:nx { no-CJKfamily } { \CJKfamilydefault } }
3932     }
3933     { \xeCJK_ensure_default_family: }
3934 }
3935 \cs_new_protected:Npn \xeCJK_ensure_default_family:
3936 {
3937     \xeCJK_family_if_exist:eF { \CJKfamilydefault }
3938     {
3939         \tl_set_eq:NN \l xeCJK_tmp_tl \CJKfamilydefault
3940         \str_if_eq:eeTF { \CJKfamilydefault } { \CJKrmdefault }
3941         { \use:n }
3942         {
3943             \xeCJK_family_if_exist:eTF { \CJKrmdefault }
3944             { \tl_gset:Nn \CJKfamilydefault { \CJKrmdefault } }
3945         }
3946     }
3947     \prop_map_inline:Nn \g xeCJK_family_font_name_prop
3948     {
3949         \prop_map_break:n
3950         { \tl_gset_rescan:Nnn \CJKfamilydefault { } { ##1 } }
3951     }
3952 }
3953 \ xeCJK_warning:nxx { CJKfamilydefault-undefined }
3954 { \l xeCJK_tmp_tl } { \CJKfamilydefault }
3955 }
3956 \xeCJK_switch_family:e { \CJKfamilydefault }
3957 \bool_if:NT \g xeCJK_math_bool { \xeCJK_set_mathfont: }
3958 }
3959 \ xeCJK_msg_new:nn { no-CJKfamily }
3960 {
3961     It~seems~that~you~have~not~declare~a~CJKfamily.\
3962     If~you~want~to~use~xeCJK~in~the~right~way,~you~should~use\\\
3963     \ xeCJK_msg_def_family_map:n {#1}'\\\
3964     in~the~preamble~to~declare~the~default~CJKfamily.\
3965 }
3966 \ xeCJK_msg_new:nn { CJKfamilydefault-undefined }
3967 {
3968     Undefined~CJK~default~family~\ xeCJK_msg_family_map:n {#1}'~
3969     has~been~replaced~by~\ xeCJK_msg_family_map:n {#2}'. \\\
3970     Try~to~use~\ xeCJK_msg_def_family_map:n {#1}'~to~define~it.
3971 }
3972 \ xeCJK_msg_new:nn { fandol }
3973 {
3974     Fandol~is~being~set~as~the~default~font~for~CJK~text.\
3975     Please~make~sure~it~has~been~properly~installed.
3976 }

```

5.14 Math font settings

Whether `CJKmath` enables the macro package option for CJK math fonts.

```
3977 \keys_define:nn { xeCJK / options } { CJKmath .bool_gset:N = \g xeCJK_math_bool }
```

`\setCJKmathfont` Set the CJK math font.

```
3978 \NewDocumentCommand \setCJKmathfont { o m }
3979 {
```

```

3980 \xeCJK_pass_args:nnn
3981   { \xeCJK_set_family:nnn { \c xeCJK_math_tl } } {#1} {#2}
3982   {}
3983 }
3984 \tl_const:Nn \c xeCJK_math_tl { CJKmath }

```

`\xeCJK_set_mathfont`: Use `\CJKfamilydefault` as the math font when no `CJK m a t h` font is set.

```

3985 \cs_new_protected:Npn \xeCJK_set_mathfont:
3986   {
3987     \cs_if_exist_use:N \xeCJK_save_um_char:
3988     \xeCJK_family_if_exist:eTF { \c xeCJK_math_tl }
3989     { \xeCJK_set_mathfont_aux: }
3990     {
3991       \xeCJK_family_if_exist:eT { \CJKfamilydefault }
3992       {
3993         \xeCJK_copy_family:ee { \c xeCJK_math_tl } { \CJKfamilydefault }
3994         \xeCJK_set_mathfont_aux:
3995       }
3996     }
3997     \cs_if_exist_use:N \xeCJK_restore_um_char:
3998   }
3999 \cs_new_protected:Npn \xeCJK_set_mathfont_aux:
4000   {
4001     \tl_const:Nx \c xeCJK_math_family_tl
4002     { \l xeCJK_fontspec_family_tl } 4003
4003     \xeCJK_declare_mathfont:ee
4004     { \c xeCJK_math_tl }
4005     { \c xeCJK_math_family_tl }
4006     \int_const:Nn \c_xeCJK_math_fam_int
4007     { \use:c { sym \c xeCJK_math_tl } }
4008     \clist_gconcat:NNN \g xeCJK_math_chars_clist
4009     \g xeCJK_CJK_range_clist \g xeCJK_FullLeft_range_clist
4010     \clist_gconcat:NNN \g xeCJK_math_chars_clist
4011     \g xeCJK_math_chars_clist \g xeCJK_FullRight_range_clist
4012     \xeCJK_gset_mathcode:Nn \g xeCJK_math_chars_clist
4013     { \c_xeCJK_math_fam_int }
4014     \xeCJK_set_mathfont_block:
4015   }
4016 \clist_new:N \g xeCJK_math_chars_clist
4017 \prop_new:N \g xeCJK_fam_prop

```

`\xeCJK_set_mathfont_block`: The math font of the partition.

```

4018 \cs_new_protected:Npn \xeCJK_set_mathfont_block:
4019   {
4020     \seq_if_empty:NF \g xeCJK_CJK_sub_class_seq
4021     {
4022       \seq_map_function:NN
4023       \g xeCJK_CJK_sub_class_seq
4024       \xeCJK_set_mathfont_block:n
4025     }
4026   }
4027 \cs_new_protected:Npn \xeCJK_set_mathfont_block:n #1
4028   {
4029     \xeCJK_block_family:nn { \c xeCJK_math_tl } {#1}
4030     \prop_get:NoNTF \g xeCJK_fam_prop
4031     \l xeCJK_fontspec_family_tl \l xeCJK_tmp_tl
4032     { \int_set:Nn \l xeCJK_fam_int { \l xeCJK_tmp_tl }
4033     {
4034       \xeCJK_declare_mathfont:ee
4035       { \c xeCJK_math_tl / #1 }
4036       { \l xeCJK_fontspec_family_tl }
4037       \xeCJK_set_mathfont_block_aux:cn
4038       { sym \c xeCJK_math_tl / #1 } {#1}
4039     }
4040     \xeCJK_gset_mathcode:cn { g xeCJK_CJK/#1_range_clist } { \l xeCJK_fam_int }

```

```

4041 }
4042 \cs_new_protected:Npn \xeCJK_set_mathfont_block_aux:Nn #1#2
4043 {
4044   \int_set_eq:NN \l_xeCJK_fam_int #1
4045   \prop_gput:Nnn \g_xeCJK_block_fam_prop {#2} {#1}
4046 }
4047 \int_new:N \l_xeCJK_fam_int
4048 \prop_new:N \g_xeCJK_block_fam_prop
4049 \cs_generate_variant:Nn \xeCJK_set_mathfont_block_aux:Nn { c }

```

`\xeCJK_declare_mathfont:nn` Note that starting from LATEX 2_ε 2020/02/02, the initial value of `\shapedefault` is `n` and the initial value of `\updefault` is `up`, which are not the same. `fontspec` package defines fonts using `\shapedefault`.

```

4050 \cs_new_protected:Npn \xeCJK_declare_mathfont:nn #1#2
4051 {
4052   \xeCJK_declare_symbol_font:nnnnn {#1} { \c_xeCJK_encoding_tl }
4053   {#2} { \mddefault } { \shapedefault }
4054   \cs_if_free:cF
4055   { \c_xeCJK_encoding_tl/#2/\bfdefault/\shapedefault }
4056   {
4057     \SetSymbolFont {#1} { bold } { \c_xeCJK_encoding_tl }
4058     {#2} { \bfdefault } { \shapedefault }
4059   }
4060   \prop_gput:Nne \g_xeCJK_fam_prop {#2} { \exp_not:c { sym #1 } }
4061 }
4062 \cs_generate_variant:Nn \prop_put:Nnn { Nne }
4063 \cs_generate_variant:Nn \prop_gput:Nnn { Nne }
4064 \cs_generate_variant:Nn \xeCJK_declare_mathfont:nn { ee }

```

`\xeCJK_declare_symbol_font:nnnn` Main function is the same as `\DeclareSymbolFont`, without encoding and duplicate definition checking.

```

4065 \cs_new_protected:Npn \xeCJK_declare_symbol_font:nnnnn #1
4066 { \xeCJK_declare_symbol_font:cnnnn { sym #1 } }
4067 \cs_new_protected:Npn \xeCJK_declare_symbol_font:Nnnnn #1
4068 {
4069   \xeCJK_new_fam:N #1
4070   \xeCJK_new_symbol_font:Nnnnn #1
4071 }
4072 \cs_generate_variant:Nn \xeCJK_declare_symbol_font:Nnnnn { c }

```

`\xeCJK_new_fam:N` We assign `\fam` from 255 downwards, and `\count18` is the LATEX 2_ε record of the last assigned `\fam` number as the lower limit of our allocator. In fact, it **would** also make sense to reduce `\e@mathgroup@top` accordingly, but this may have a detrimental effect that we have not addressed yet.

```

4073 \cs_new_protected:Npn \xeCJK_new_fam:N #1
4074 {
4075   \int_compare:nNnTF
4076   { \g_xeCJK_fam_allocation_int } > { \g_xeCJK_fam_bottom_int }
4077   {
4078     \int_set_eq:NN \allocationnumber \g_xeCJK_fam_allocation_int
4079     \int_const:Nn #1 { \allocationnumber }
4080     \iow_log:x
4081     {
4082       \token_to_str:N #1 =
4083       \token_to_str:N \mathgroup \int_use:N \allocationnumber
4084     }
4085     \int_gdecr:N \g_xeCJK_fam_allocation_int
4086   }
4087   { \xeCJK_error:n { fam-exhausted } }
4088 }
4089 \tex_countdef:D \g_xeCJK_fam_bottom_int = 18 ~
4090 \int_new:N \g_xeCJK_fam_allocation_int
4091 \int_gset:Nn \g_xeCJK_fam_allocation_int { 255 }
4092 \xeCJK_msg_new:nn { fam-exhausted }
4093 { no~room~for~a~new~fam. }

```

`\xeCJK_new_symbol_font:Nnnnn` The function is the same as `\new@symbolfont` but we don't add counters like `\c@mv@normal` and `\c@mv@bold`.

```

4094 \cs_new_protected:Npn \xeCJK_new_symbol_font:Nnnnn #1#2#3#4#5
4095   { \xeCJK_new_symbol_font:Nc #1 { #2/#3/#4/#5 } }
4096 \cs_new_protected:Npn \xeCJK_new_symbol_font:NN #1#2
4097   {
4098     \tl_put_right:Nn \group@list { \group@elt #1 #2 }
4099     \cs_set:Npn \version@elt ##1
4100       { \tl_put_right:Nn ##1 { \getanddefine@fonts #1 #2 } }
4101     \version@list
4102   }
4103 \cs_generate_variant:Nn \xeCJK_new_symbol_font:NN { Nc }

```

`\xeCJK_gset_mathcode:Nn` The math category of CJK character is fixed to \mathord .

```

4104 \cs_new_protected:Npn \xeCJK_gset_mathcode:Nn #1#2
4105   {
4106     \clist_map_inline:Nn #1
4107     {
4108       \xeCJK_set_char_class_aux:Nnw \xeCJK_gset_mathcode:nnnn { ##1 }
4109       { 0 } { #2 }
4110     }
4111   }
4112 \cs_generate_variant:Nn \xeCJK_gset_mathcode:Nn { c }
4113 \cs_new_protected:Npn \xeCJK_gset_mathcode:nnnn #1#2#3#4
4114   {
4115     \xeCJK_check_num_range:nnNN { #1 } { #2 } \l xeCJK_begin_int \l xeCJK_end_int
4116     \xeCJK_int_until_do:nn { \l xeCJK_begin_int > \l xeCJK_end_int }
4117     {
4118       \xeCJK_gset_mathcode:Nnn \l xeCJK_begin_int { #3 } { #4 }
4119       \int_incr:N \l xeCJK_begin_int
4120     }
4121   }
4122 \cs_new_protected:Npn \xeCJK_gset_mathcode:Nnn #1#2#3
4123   { \tex_global:D \tex_Umathcode:D #1 = #2 ~ #3 ~ #1 }

```

5.15 Spacing adjustment in transcription environment

If `Verb` is set to `env`, only `\xeCJKVerbAddon` is used in the LATEX transcription environment, but not `\verb`. The judgment of the current usage environment is based on the use of `\begingroup` and `\endgroup` to group in the standard LATEX context definition.

```

4124 \int_new:N \l xeCJK_verb_case_int
4125 \keys_define:nn { xeCJK / options }
4126   {
4127     Verb.choices:nn =
4128     { true , env+ , env , false }
4129     { \int_set_eq:NN \l xeCJK_verb_case_int \l_keys_choice_int } ,
4130     Verb.default:n = { env }
4131   }
4132 \cs_new_protected:Npn \xeCJK_verb_font_hook:
4133   {
4134     \if_case:w \l xeCJK_verb_case_int
4135     \or:
4136       \xeCJK_nobreak_skip_zero:
4137     \or:
4138       \int_compare:nNnTF \tex_currentgrouptype:D = { 14 }
4139       { \xeCJKVerbAddon }
4140       { \xeCJK_nobreak_skip: }
4141     \or:
4142       \int_compare:nNnTF \tex_currentgrouptype:D = { 14 }
4143       { \xeCJKVerbAddon }
4144       { \xeCJK_nobreak_skip_zero: }
4145     \fi:
4146   }
4147 \xeCJK_after_preamble:n
4148   {
4149     \cs_set_protected:Npx \verbatim@font

```

```

4150     { \exp_not:o { \verbatim@font } \xeCJK_verb_font_hook: }
4151   }
\xeCJK_nobreak_skip_zero: 4152 \cs_new_protected:Npn \xeCJK_nobreak_skip_zero:
  \xeCJK_nobreak_skip: 4153   {
4154     \xeCJK_reset_shipout_skip:
4155     \cs_set_eq:NN \xeCJK_shipout_check_for_glue: \xeCJK_check_for_glue:
4156     \cs_set_eq:NN \xeCJK_shipout_boundary:w \xeCJK_CJK_and_Boundary:w
4157     \tl_put_right:Nn \lxeCJK_reset_shipout_skip_hook_tl
4158     {
4159       \cs_set_eq:NN \xeCJK_check_for_glue: \xeCJK_shipout_check_for_glue: 4160
         \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_shipout_boundary:w 4161
4162     }
4163     \xeCJK_cs_clear:N \CJKglue
4164     \xeCJK_cs_clear:N \CJKeclue
4165     \xeCJK_cs_clear:N \xeCJK_check_for_glue:
4166     \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_class_group_end:
4167     \cs_set_eq:NN \xeCJK_punct_hskip:n \xeCJK_nobreak_hskip:n
4168     \cs_set_eq:NN \xeCJK_punct_breakable_kern:n \xeCJK_nobreak_hskip:n
4169   }
\cs_new_protected:Npn \xeCJK_nobreak_skip:
4170   {
4171     \xeCJK_reset_shipout_skip:
4172     \xeCJK_glue_to_skip:nN { \CJKglue } \lxeCJK_ccglue_skip
4173     \skip_if_eq:nnTF { \lxeCJK_ccglue_skip } { \c_zero_skip } 4174
       { \xeCJK_cs_clear:N \CJKglue }
4175     { \cs_set_eq:NN \CJKglue \xeCJK_nobreak_ccglue: }
4176     \xeCJK_glue_to_skip:nN { \CJKeclue } \lxeCJK_ecglue_skip
4177     \skip_if_eq:nnTF { \lxeCJK_ecglue_skip } { \c_zero_skip } 4178
       { \xeCJK_cs_clear:N \CJKeclue }
4179     { \cs_set_eq:NN \CJKeclue \xeCJK_nobreak_ecglue: }
4180     \cs_set_eq:NN \xeCJK_punct_hskip:n \xeCJK_nobreak_hskip:n
4181     \cs_set_eq:NN \xeCJK_punct_breakable_kern:n \xeCJK_nobreak_hskip:n
4182   }
4183 \cs_new_protected:Npn \xeCJK_nobreak_ccglue:
4184   { \xeCJK_no_break: \skip_horizontal:N \lxeCJK_ccglue_skip }
4185 \cs_new_protected:Npn \xeCJK_nobreak_ecglue:
4186   { \xeCJK_no_break: \skip_horizontal:N \lxeCJK_ecglue_skip }
\xeCJK_reset_shipout_skip: 4187 \cs_new_protected:Npn \xeCJK_reset_shipout_skip:
4188   {
4189     \cs_set_eq:NN \xeCJK_shipout_CJKglue: \CJKglue
4190     \cs_set_eq:NN \xeCJK_shipout_CJKeclue: \CJKeclue
4191     \cs_set_eq:NN \xeCJK_shipout_punct_hskip:n \xeCJK_punct_hskip:n
4192     \cs_set_eq:NN
4193     \xeCJK_shipout_punct_breakable_kern:n \xeCJK_punct_breakable_kern:n
4194     \tl_set:Nx \lxeCJK_off_verb_addon_tl
4195     {
4196       \bool_if:NTF \lxeCJK_xecglue_bool
4197       { \keys_set:nn { xeCJK / options } { xCJKeclue = true } } 4198
         { \keys_set:nn { xeCJK / options } { xCJKeclue = false } } 4199
4200     }
4201     \exp_not:n
4202     {
4203       \cs_set_eq:NN \CJKglue \xeCJK_shipout_CJKglue:
4204       \cs_set_eq:NN \CJKeclue \xeCJK_shipout_CJKeclue:
4205       \cs_set_eq:NN \xeCJK_punct_hskip:n \xeCJK_shipout_punct_hskip:n
4206       \cs_set_eq:NN \xeCJK_punct_breakable_kern:n
4207       \xeCJK_shipout_punct_breakable_kern:n
4208     }
4209     \lxeCJK_reset_shipout_skip_hook_tl
4210   }
\xeCJK_add_to_shipout:n { \lxeCJK_off_verb_addon_tl }
4211 \keys_set:nn { xeCJK / options } { xCJKeclue = false }
4212 \tl_new:N \lxeCJK_reset_shipout_skip_hook_tl

```

\xeCJKOffVerbAddon **\xeCJKVerbAddon** has been adjusted more significantly and should only be used in the grouping environment. In order to easily adjust the spacing for

\xeCJKVerbAddon alignment, here only the characters are divided into two classes, and **\CJKeclue** is also inserted between the CJK class and the boundary (space)

The width of the parent "M" is equal to `\fontdimen2` to determine if the current font is an equal-width font. If it is not an equal-width font, then set the spacing to zero or the body spacing.

```

4213 \NewDocumentCommand \xeCJKVerbAddon {}
4214 {
4215   \int_compare:nNnF \tex_currentgrouplevel:D = \c_zero_int
4216   {
4217     \bool_if:NF \l_xeCJK_listings_env_bool
4218     {
4219       \dim_compare:nNnTF
4220       { \tex_fontdimen:D 2 ~ \tex_font:D } =
4221       { \tex_fontcharwd:D \tex_font:D \c_xeCJK_mono_letter_int }
4222       {
4223         \xeCJK_set_verb_exspace:
4224         \xeCJK_verb_addon:
4225       }
4226     }
4227     \int_if_odd:nTF { \l_xeCJK_verb_case_int }
4228     { \xeCJK_nobreak_skip_zero: }
4229     { \xeCJK_nobreak_skip: }
4230   }
4231 }
4232 }
4233 }
4234 \int_const:Nn \c_xeCJK_mono_letter_int { 77 }
4235 \bool_new:N \l_xeCJK_listings_env_bool
4236 \NewDocumentCommand \xeCJKOffVerbAddon {}
4237 { \tl_use:N \l_xeCJK_off_verb_addon_tl }
4238 \tl_new:N \l_xeCJK_off_verb_addon_tl
4239 \cs_new_protected:Npn \xeCJK_verb_addon:
4240 {
4241   \bool_if:NF \l_xeCJK_verb_addon_bool
4242   { \xeCJK_verb_addon_action: }
4243   \skip_if_eq:nnTF { \l_xeCJK_verb_exspace_skip } { \c_zero_skip }
4244   {
4245     \xeCJK_cs_clear:N \CJkg glue
4246     \xeCJK_cs_clear:N \CJkec glue
4247   }
4248   {
4249     \skip_set_eq:NN \l_xeCJK_ccglue_skip \l_xeCJK_verb_exspace_skip
4250     \skip_set:Nn \l_xeCJK_ecglue_skip { \l_xeCJK_verb_exspace_skip / 2 }
4251     \cs_set_eq:NN \CJkg glue \xeCJK_nobreak_ccglue:
4252     \cs_set_eq:NN \CJkec glue \xeCJK_nobreak_ecglue:
4253   }
4254   \cs_set_eq:NN \xeCJK_check_for_glue: \CJkec glue
4255   \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_verb_CJK_and_Boundary:w
4256 }
4257 \cs_new_protected:Npn \xeCJK_verb_addon_action:
4258 {
4259   \bool_set_true:N \l_xeCJK_verb_addon_bool
4260   \xeCJK_set_char_class_eq:nn { FullLeft } { CJK }
4261   \xeCJK_set_char_class_eq:nn { FullRight } { CJK }
4262   \xeCJK_set_char_class_eq:nn { HalfLeft } { Default }
4263   \xeCJK_set_char_class_eq:nn { HalfRight } { Default }
4264   \xeCJK_set_char_class_eq:nn { NormalSpace } { Default }
4265   \cs_set_eq:NN \xeCJK_shipout_CJkg glue \CJkg glue
4266   \cs_set_eq:NN \xeCJK_shipout_CJkec glue \CJkec glue
4267   \cs_set_eq:NN \xeCJK_shipout_check_for_glue: \xeCJK_check_for_glue:
4268   \cs_set_eq:NN \xeCJK_shipout_boundary:w \xeCJK_CJK_and_Boundary:w
4269   \cs_set_protected:Npx \xeCJKOffVerbAddon
4270   {
4271     \xeCJK_reset_char_class:n { FullLeft }
4272     \xeCJK_reset_char_class:n { FullRight }
4273     \xeCJK_reset_char_class:n { HalfLeft }
4274     \xeCJK_reset_char_class:n { HalfRight }
4275     \xeCJK_reset_char_class:n { NormalSpace }
4276     \bool_if:NTF \l_xeCJK_xecglue_bool

```

```

4277     { \keys_set:nn { xCJK / options } { xCJKecglue = true }
4278     { \keys_set:nn { xCJK / options } { xCJKecglue = false }
4279     \exp_not:n
4280     {
4281       \cs_set_eq:NN \CJKglue \xeCJK_shipout_CJKglue:
4282       \cs_set_eq:NN \CJKecglue \xeCJK_shipout_CJKecglue:
4283       \cs_set_eq:NN \xeCJK_check_for_glue:\
4284       \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_shipout_boundary:w
4285     }
4286   }
4287   \xeCJK_add_to_shipout:n { \xeJKOffVerbAddon }
4288   \keys_set:nn { xCJK / options } { xCJKecglue = false }
4289 }
4290 \cs_new_protected:Npn \xeCJK_verb_CJK_and_Boundary:w
4291 { \xeCJK_class_group_end: \CJKecglue }
4292 \cs_new_protected:Npn \xeCJK_reset_char_class:n #1
4293 {
4294   \int_set:Nn \l_xeCJK_tmp_int { \xeCJK_class_num:n {#1} }
4295   { \tex_XeTeXcharclass:D ##1̃ = \l_xeCJK_tmp_int }
4296 }
4297 }
4298 \bool_new:N \l_xeCJK_verb_addon_bool
4299 \cs_new_eq:NN \CJKfixedspacing \xeCJKVerbAddon

```

`\xeCJK_set_verb_exspace:In` the transcription environment, the spacing between CJK characters is the difference between the width of two spaces in the current western font and the current font size, and the spacing between the western text and spaces is half of the spacing between CJK characters.

```

4300 \cs_new_protected:Npn \xeCJK_set_verb_exspace:
4301 {
4302   \tl_if_exist:cTF { xCJK/verb/\CJK@family/\curr@fontshape/\f@size }
4303   {
4304     \skip_set:Nn \l_xeCJK_verb_exspace_skip
4305     { \use:c { xCJK/verb/\CJK@family/\curr@fontshape/\f@size } }
4306   }
4307   {
4308     \tl_set:Nx \l_xeCJK_current_coor_tl { \CJK@family/\curr@fontshape }
4309     \prop_get:NoNTF \g_xeCJK_scale_family_prop
4310     \l_xeCJK_current_coor_tl \l_xeCJK_family_tl
4311     {
4312       \xeCJK_switch_family:o { \l_xeCJK_family_tl }
4313       \skip_zero:N \l_xeCJK_verb_exspace_skip
4314     }
4315     {
4316       \group_begin: \xeCJK_select_font: \exp_args:No \group_end:
4317       \xeCJK_set_verb_exspace:n
4318       { \dim_use:N \tex_fontcharwd:D \tex_font:D "4E00 ~ }
4319     }
4320   }
4321 }
4322 \skip_new:N \l_xeCJK_verb_exspace_skip

```

`\xeCJK_set_verb_exspace:n` When the width of two western spaces is smaller than the width of one CJK text, the CJK font currently used is reduced appropriately.

```

4323 \cs_new_protected:Npn \xeCJK_set_verb_exspace:n #1
4324 {
4325   \skip_set:Nn \l_xeCJK_verb_exspace_skip
4326   { 2 \tex_fontdimen:D 2 ~ \tex_font:D - #1 }
4327   \dim_compare:nNnTF \l_xeCJK_verb_exspace_skip < \c_zero_dim
4328   {
4329     \skip_zero:N \l_xeCJK_verb_exspace_skip
4330     \exp_args:Nee \xeCJK_set_verb_scale:nn
4331     { \dim_to_fp:n { 2 \tex_fontdimen:D 2 ~ \tex_font:D }
4332     { \dim_to_fp:n {#1} } }
4333   }
4334   {
4335     \tl_const:cx { xCJK/verb/\CJK@family/\curr@fontshape/\f@size }

```

4336

```
{ \skip_use:N \l_xeCJK_verb_exspace_skip }
```

4337

```
}
```

4338 }

`\xeCJK_set_verb_scale`: Reduce the CJK font and save the related information.

```

4339 \cs_new_protected:Npn \xeCJK_set_verb_scale:#1#2
4340 {
4341   \fp_set:Nn \l_xeCJK_scale_factor_fp { #1 / #2 }
4342   \xeCJK_warning:nxx { scale-factor }
4343   { \fp_eval:n { trunc ( \l_xeCJK_scale_factor_fp , 4 ) }
4344     { \fp_eval:n { ceil ( #2 / #1 , 4 ) } }
4345   \xeCJK_add_font_features:Nne \c_true_bool
4346   { } { Scale = { \fp_use:N \l_xeCJK_scale_factor_fp } }
4347   \prop_gput:Noo \g_xeCJK_scale_family_prop
4348   \l_xeCJK_current_coord_tl \l_xeCJK_family_tl
4349 }
4350 \xeCJK_msg_new:nn { scale-factor }
4351 {
4352   \token_to_str:N \xeCJKVerbAddon'~may~not~work~properly.\\
4353   You~may~set~Scale=#1'~to~CJKfamily~
4354   \xeCJK_msg_family_map:n { \l_xeCJK_family_tl },\\
4355   or~set~Scale=#2'~to~family~
4356   \str_if_eq:eeTF { \f@family } \ttdefault
4357   { \token_to_str:N \ttdefault } { \f@family }'.
4358 }
4359 \fp_new:N \l_xeCJK_scale_factor_fp
4360 \prop_new:N \g_xeCJK_scale_family_prop

```

`\xeCJK_visible_space`: If the document does not use EU1 as the default font encoding, then the default typewriter font family is likely to be the traditional TEX fonts.

`@setupverbvisiblespace` This is when the visible spaces are encoded according to OT1, which is generally `\char32` in fonts.

```

4361 \cs_new_protected:Npn \xeCJK_setup_visible_space:
4362 {
4363   \xeCJK_make_boundary:
4364   \xeCJK_glyph_if_exist:NTF { ^^^^2423 }
4365   { \tl_set:Nn \l_xeCJK_visible_space_tl { ^^^^2423 } }
4366   {
4367     \int_compare:nNnTF { \tex_XeTeXfonttype:D \tex_font:D } = \c_zero_int
4368     {
4369       \tl_set:Nx \l_xeCJK_visible_space_tl
4370       {
4371         \str_if_eq:eeTF { \f@family } { \ttdefault }
4372         { \c_catcode_other_space_tl }
4373         { \exp_not:N \textvisiblespace }
4374       }
4375     }
4376     { \xeCJK_visible_space_fallback: }
4377   }
4378   \cs_set_eq:NN \@xobeysp \l_xeCJK_visible_space_tl
4379 }
4380 \tl_new:N \l_xeCJK_visible_space_tl
4381 \cs_set_eq:NN \@setupverbvisiblespace \xeCJK_setup_visible_space:

```

`_xeCJK_visible_space_fallback`: We use the visible space symbol (U+2423) in the `lmtt` font as the backup of the corresponding symbol in the current font, but the font size of `lmtt` may not match with the current font. Therefore, some adjustments need to be made here to ensure alignment even when using the backup visual space symbols.

```

4382 \cs_new_protected:Npn \xeCJK_visible_space_fallback:
4383 {
4384   \exp_args:Nc \xeCJK_visible_space_fallback_auxi:N
4385   { xeCJK/space/\curr@fontshape/\f@size }
4386 }
4387 \cs_new_protected:Npn \xeCJK_visible_space_fallback_auxi:N #1
4388 {
4389   \cs_if_exist:NF #1
4390   { \xeCJK_visible_space_fallback_auxii:N #1 }

```

```
4391 \tl_set:Nn \l_xeCJK_visible_space_tl {#1}  
4392 }
```

`_xeCJK_visible_space_fallback_auxii:N` If the width of the current font space is different from the backup font `lmtt`, the font size of `\textvisiblespace` will be scaled down accordingly.

```

4393 \cs_new_protected:Npn \xeCJK_visible_space_fallback_auxii:N #1
4394 {
4395   \group_begin:
4396   \exp_args:No \xeCJK_set_visible_space_size:n 4397
         { \dim_use:N \tex_fontdimen:D 2 ~ \tex_font:D } 4398
\cs_new_protected:Npx #1
4399   { \group_begin: \tex_the:D \tex_font:D ^^^^2423 \group_end: }
4400   \group_end:
4401 }
4402 \cs_new_protected:Npn \xeCJK_set_visible_space_size:n #1
4403 {
4404   \fontencoding { \UnicodeEncodingName }
4405   \tl_set:Nn \f@family { lmtt }
4406   \selectfont
4407   \dim_compare:nNnF {#1} = { \tex_fontdimen:D 2 ~ \tex_font:D }
4408   {
4409     \fontsize
4410     {
4411       \dim_eval:n
4412       {
4413         \f@size pt *
4414         \dim_ratio:nn {#1} { \tex_fontdimen:D 2 ~ \tex_font:D }
4415       }
4416     }
4417     { \f@baselineskip }
4418   \selectfont
4419 }
4420 }

```

5.16 *xeCJK* Other Options

LocalConfig declares the option to load the local configuration file.

```

4421 \keys_define:nn { xeCJK / options }
4422 {
4423   LocalConfig .choice: ,
4424   LocalConfig / false .code:n =
         { \bool_gset_false:N \g xeCJK_config_bool } ,
4425   LocalConfig / true .code:n =
         {
4426     \bool_gset_true:N \g xeCJK_config_bool
4427     \tl_gset:Nn \g xeCJK_config_name_tl { xeCJK }
4428   } ,
4429   LocalConfig / unknown .code:n =
         {
4430     \bool_gset_true:N \g xeCJK_config_bool
4431     \tl_gset:Nx \g xeCJK_config_name_tl { xeCJK - \l_keys_value_tl }
4432   } ,
4433   LocalConfig .default:n = { true }
4434 }
4435 \tl_new:N \g xeCJK_config_name_tl
4436 \bool_new:N \g xeCJK_config_bool

```

`CJKnumber` and `indentfirst` are obsolete options.

```

4440 \keys_define:nn { xeCJK / options }
4441 {
4442   CJKnumber .code:n =
         { \xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { CJKnumb } } ,
4443   indentfirst .code:n =
         { \xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { indentfirst } } ,
4444   normalindentfirst .code:n =
         { \xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { } }
4445 }

```

```

4449 \xeCJK_msg_new:nn { option-deprecated }
4450 {
4451   The~`#1'~option~is~deprecated.\\
4452   \tl_if_empty:nF {#2}
4453   { You~may~load~the~package~`#2'~after~xeCJK~to~use~its~function.\\ }
4454 }

```

quiet Passes unknown options used when calling `xeCJK` to the `fontspec` macro package. The `quiet` and `silent` options for `fontspec`. The `silent` item is modified to make it applicable to `xeCJK`.

```

4455 \keys_define:nn { xeCJK / options }
4456 {
4457   quiet.code:n =
4458   {
4459     \msg_redirect_module:nnn { xeCJK } { warning } { info }
4460     \msg_redirect_module:nnn { xeCJK } { info } { none } 4461
4461     \xeCJK_if_package_loaded:nF { fontspec }
4462     { \PassOptionsToPackage { quiet } { fontspec }
4463     } ,
4464   silent.code:n =
4465   {
4466     \msg_redirect_module:nnn { xeCJK } { warning } { none
4467     \msg_redirect_module:nnn { xeCJK } { info } { none } 4468
4468     \xeCJK_if_package_loaded:nF { fontspec }
4469     { \PassOptionsToPackage { silent } { fontspec }
4470     } ,
4471   unknown.code:n =
4472   {
4473     \xeCJK_if_package_loaded:nTF { fontspec }
4474     { \xeCJK_error:nx { key-unknown } { \l_keys_key_tl } }
4475     { \PassOptionsToPackage { \l_keys_key_tl } { fontspec }
4476     }
4477   }
4478 \xeCJK_msg_new:nn { key-unknown }
4479 {
4480   Sorry,~but~xeCJK/options~does~not~have~a~key~called~`#1'.\\ \\
4481   The~key~`#1'~is~being~ignored.
4482 }

```

5.17 `xeCJK` initialization settings

```

\CJKsymbol 4483 \cs_new_eq:NN \CJKsymbol \use:n
\CJKpunctsymbol 4484 \cs_new_eq:NN \CJKpunctsymbol \use:n

```

The initialization setting of `xeCJK` macro package. 4485 `\keys_set:nn { xeCJK / options } 4486`

```

4487 CJKglue = { { \skip_horizontal:n { \c_zero_dim plus 0.08 \tex_baselineskip:D } } ,
4488 CJKecglue = { ~ } ,
4489 xCJKecglue == false ,
      sy
      nc
      ,
      co
      rr
      ec
      te
      d
      by
      el
      de
      r
      m
      an
      ==
4490 CheckSingle = false ,
4491 PlainEquation = false ,

```

```
4492 CheckFullRight = false ,
4493 CJKspace         = false ,
4494 CJKmath          = false ,
4495 xeCJKactive      = true  ,
4496 LocalConfig      = true  ,
4497 LoadFandol       = true  ,
4498 RubberPunctSkip = true  ,
4499 Verb             = env   ,
4500 EmboldenFactor   = 4     ,
4501 SlantFactor       = 0.167 ,
4502 PunctStyle       = quanjiao ,
4503 NewLineCS        = { \par \[ } ,
4504 EnvCS            = { \begin \end } ,
4505 WidowPenalty     = { 10 000 } ,
```



```

4506 NoBreakCS      = { \footnote \footnotemark \nobreak },
4507 KaiMingPunct   = { ^^^^3002 ^^^^ff0e ^^^^ff1f ^^^^ff01 } ,
4508 LongPunct      = { ^^^^2014 ^^^^2e3a ^^^^2025 ^^^^2026 } ,
4509 MiddlePunct= { ^^^^2013 ^^^^2014 ^^^^2e3a ^^^^2027 ^^^^00b7 ^^^^30fb ^^^^ff65
},
4510 AllowBreakBetweenPuncts = false
4511 }
4512 \defaultCJKfontfeatures { Script = CJK }

```

Half-letter line connection number¹⁵ should be half-angle width.

```

4513 \xeCJKsetwidth { ^^^^2013 } { 0.5 em }

```

Execute the macro package option and load the `fontspec` macro package.

```

4514 \cs_if_exist:NTF \ProcessKeyOptions
4515   { \ProcessKeyOptions [ xeCJK / options ] }
4516   {
4517     \RequirePackage { l3keys2e }
4518     \ProcessKeysOptions { xeCJK / options }
4519   }
4520 \RequirePackage { fontspec } [ 2020/02/03 ]

```

`\xeCJK_encoding_tl` Save the font encoding used by `fontspec` when declaring fonts.

```

4521 \tl_const:Nx \c xeCJK_encoding_tl { \g_fontspec_encoding_tl }

```

Give a warning for the options that cannot be set by `\xeCJKsetup`.

```

4522 \keys_define:nn { xeCJK / options }
4523   {
4524     LocalConfig.code:n =
4525       { \ xeCJK_warning:nx { option-invalid } { \_l_keys_key_tl } }
4526   }
4527 \ xeCJK_msg_new:nn { option-invalid }
4528   {
4529     The~`#1'~option~can~only~be~set~in~the~optional~argument~to~the\\
4530     \token_to_str:N \usepackage \ command~when~xeCJK~is~being~loaded.\\
4531     Please~do~not~set~it~via~the~\token_to_str:N \xeCJKsetup \ command. 4532
4532   }

```

```

\CJKrmdefault 4533 \tl_if_exist:NF \CJKrmdefault { \tl_gset:Nn \CJKrmdefault { rm } }
\CJKsfdefault 4534 \tl_if_exist:NF \CJKsfdefault { \tl_gset:Nn \CJKsfdefault { sf } }
\CJKttdefault 4535 \tl_if_exist:NF \CJKttdefault { \tl_gset:Nn \CJKttdefault { tt } }
\CJKfamilydefault 4536 \tl_new:N \l xeCJK_family_default_init_tl
4537 \cs_new_eq:NN \ xeCJK_family_default_wrap:n \use:n
4538 \tl_set:Nx \l xeCJK_family_default_init_tl
4539   {
4540     \exp_not:N \ xeCJK_family_default_wrap:n
4541     {
4542       \tl_if_exist:NTF \CJKfamilydefault
4543         { \exp_not:o \CJKfamilydefault }
4544         { \exp_not:N \CJKrmdefault }
4545     }
4546   }
4547 \tl_gset_eq:NN \CJKfamilydefault \l xeCJK_family_default_init_tl

```

`\xeCJKsetup` Set the interface of `xeCJK` in the introduction area or document.

```

4548 \NewDocumentCommand \xeCJKsetup { +m }
4549   {
4550     \keys_set:nn { xeCJK / options } { #1 }
4551     \tex_ignorespaces:D
4552   }

```

```

\xeCJKsetboldenfactor 4553 \NewDocumentCommand \xeCJKsetboldenfactor { m }
\xeCJKsetslantfactor 4554   { \xeCJKsetup { EmboldenFactor = { #1 } } }
4555 \NewDocumentCommand \xeCJKsetslantfactor { m }
4556   { \xeCJKsetup { SlantFactor = { #1 } } }

```

¹⁵Section 5.13 of the "Punctuation Usage of Chinese Texts with English Interleaved (Draft)"

```

\punctstyle 4557 \NewDocumentCommand \punctstyle { m } { \xeCJKsetup { PunctStyle = {#1} }
\xeCJKplainchr 4558 \NewDocumentCommand \xeCJKplainchr { } { \xeCJKsetup { PunctStyle = plain }

\CJKsetecglue 4559 \NewDocumentCommand \CJKsetecglue { m } { \xeCJKsetup { CJKe glue = {#1} } }
4560 \cs_new_eq:NN \xeCJKsetecglue \CJKsetecglue

\CJKspace 4561 \NewDocumentCommand \CJKspace { } { \xeCJKsetup { CJKspace = true }
\CJKnospace 4562 \NewDocumentCommand \CJKnospace { } { \xeCJKsetup { CJKspace = false }

\xeCJKallowbreakbetweenpuncts 4563 \NewDocumentCommand \xeCJKallowbreakbetweenpuncts { }
\xeCJKnobreakbetweenpuncts 4564 { \xeCJKsetup { AllowBreakBetweenPuncts = true } }
4565 \NewDocumentCommand \xeCJKnobreakbetweenpuncts { }
4566 { \xeCJKsetup { AllowBreakBetweenPuncts = false }

\xeCJKenablefallback 4567 \NewDocumentCommand \xeCJKenablefallback { }
\xeCJKdisablefallback 4568 { \xeCJKsetup { AutoFallBack = true } }
4569 \NewDocumentCommand \xeCJKdisablefallback { }
4570 { \xeCJKsetup { AutoFallBack = false }

\xeCJKsetcharclass 4571 \NewDocumentCommand \xeCJKsetcharclass { m m m m }
4572 {
4573 \xeCJK_set_char_class:nnn {#1} {#2} {#3}
4574 \xeCJKResetPunctClass
4575 }

```

5.18 Compatibility Fixes

`\xeCJK@update@fam` enables the CJK font used in the path set by `\urlstyle` or `\UrlFont`. Use the `\everymath` hook to redefine CJK math fonts in the `\Url@MathSetup` sub-math mode to make sure our settings take effect after `\check@mathfonts` and are not overwritten by it. A more reasonable way to switch is to define a new `\mathversion`.

```

4576 \cs_new_protected:Npn \xeCJK@update@fam
4577 {
4578 \addto@hook \everymath
4579 {
4580 \xeCJK_update_main_fam:
4581 \xeCJK_update_block_fam:
4582 }
4583 }
4584 \cs_new_protected:Npn \xeCJK_update_main_fam:
4585 {
4586 \group_begin:
4587 \xeCJK_select_font:
4588 \exp_last_unbraced:NNNo \group_end:
4589 \tex_textfont:D \c_xeCJK_math_fam_int \tex_the:D \tex_font:D
4590 }
4591 \cs_new_protected:Npn \xeCJK_update_block_fam:
4592 {
4593 \prop_if_empty:NF \g_xeCJK_block_fam_prop
4594 {
4595 \prop_map_function:NN
4596 \g_xeCJK_block_fam_prop
4597 \xeCJK_update_block_fam:nn
4598 }
4599 }
4600 \cs_new_protected:Npn \xeCJK_update_block_fam:nn #1#2
4601 {
4602 \int_set:Nn \l_xeCJK_fam_int {#2}
4603 \group_begin:
4604 \xeCJK_select_font:n {#1}
4605 \exp_last_unbraced:NNNo \group_end:
4606 \tex_textfont:D \l_xeCJK_fam_int \tex_the:D \tex_font:D
4607 }
4608 \xeCJK_after_end_preamble:n
4609 {
4610 \bool_lazy_and:nnT
4611 { \g_xeCJK_math_bool }

```

```

4612     {\cs_if_exist_p:N \Url@MathSetup }
4613     {\tl_put_right:Nn \Url@MathSetup {\xeCJK@update@fam } }
4614   }

```

The definition of `\relax` (in LATEX 2 ϵ is

```

\math \def\relax{\ifmmode\@badmath\else$\fi}

```

The `\relax` at the beginning of this definition is to prevent the `\relax` from being incorrectly determined when it appears at the beginning of a table cell

(because TEX will first see if the first non-expandable non-space mark in a cell is `\omit` or `\noalign`) But it will

`\xeCJK_math_robust:N` creates a boundary, so that `xeCJK` cannot see the `$` that appears after `\relax`. Thus cannot join the spacing.¹⁶ . Using the ϵ -TEX

`\protected` to define it, it can be avoided without `\relax`, or changing `\relax` to `\scan_align_safe_stop`: can avoid these cases. Also `\MakeRobust` (is used in `fixltx2e`, and we need to handle it carefully. Also `ulem` defines a `\MakeRobust`, and if it is loaded before `fixltx2e`, then the `fixltx2e` definition will be invalid (because `fixltx2e` uses `\providecommand*` to define `\MakeRobust`) But the definition of `ulem` is not exactly correct and does not take into account the fact that TEX does not omit the spaces after the control symbols.

```

4615 \cs_new_protected:Npn \xeCJK_math_robust:N #1
4616   {
4617     \group_begin: \exp_args:NcNc \group_end:
4618     { \xeCJK_math_robust_aux:NN } #1 { \cs_to_str:N #1 ~ }
4619   }
4620 \cs_new_protected:Npn \xeCJK_math_robust_aux:NN #1#2
4621   {
4622     \exp_args:Ne \str_case:nnTF { \cs_replacement_spec:N #1 }
4623     {
4624       { \x@protect #1 \protect #2 } { }
4625       { \protect #2 } { }
4626     }
4627     { \xeCJK_math_robust:NN #1#2 }
4628     { \xeCJK_math_robust:NN #1#1 }
4629   }
4630 \cs_new_protected:Npn \xeCJK_math_robust:NN #1#2
4631   {
4632     \str_if_eq:eeTF { \cs_argument_spec:N #2 } { }
4633     {
4634       \exp_args:No \tl_if_head_eq_meaning:nNTF {#2} \scan_stop:
4635       {
4636         \cs_gset_protected:Npx #1
4637         { \tl_tail:N #2 }
4638       }
4639       {
4640         \cs_if_eq:NNTF #1 \ensuremath
4641         {
4642           \cs_gset_protected:Npx #1
4643           { \exp_not:o {#2} }
4644         }
4645         {
4646           \xeCJK_warning:nxx { robust-failure }
4647           { \token_to_str:N #1 } { \token_to_meaning:N #2 }
4648         }
4649       }
4650     }
4651     {
4652       \xeCJK_warning:nxx { robust-failure }
4653       { \token_to_str:N #1 } { \token_to_meaning:N #2 }
4654     }
4655   }
4656 \xeCJK_msg_new:nnn { robust-failure }
4657 { \xeCJK~can~not~make~`#1'~robust. }
4658 {

```

4659 The~current~meaning~of~`#1'~is:\\
4660 \iow_indent:n {#2}

¹⁶ <http://tex.stackexchange.com/q/124773>

```

4661 }
4662 \cs_if_eq:NNTF \(\math
4663 {
4664   \xeCJK_math_robust:N \(\
4665   \cs_set_eq:NN \math \(\ 4666
4666 }
4667 {
4668   \xeCJK_math_robust:N \(\
4669   \xeCJK_math_robust:N \math
4670 }
4671 \cs_if_eq:NNTF \) \endmath
4672 {
4673   \xeCJK_math_robust:N \)
4674   \cs_set_eq:NN \endmath \)
4675 }
4676 {
4677   \xeCJK_math_robust:N \)
4678   \xeCJK_math_robust:N \endmath
4679 }
4680 \xeCJK_math_robust:N \ensuremath

```

`\fontfamily` For versions prior to LATEX 2_ε 2020/02/02, modify `\fontfamily` so that the main CJK font family follows the main Spanish characters. `\xeCJK@fontfamily` body update, later versions can be handled with new hooks such as `\@rmfamilyhook`. LATEX 2_ε 2020/10/01 provides new `\xeCJK@family`

The NFSS hooks.

```

4681 \ctex_if_format_at_least:nTF { 2020/10/01 }
4682 {
4683   \cs_set_eq:NN \xeCJK@family \xeCJK_switch_family:e
4684   \ctex_gadd_ltxhook:nn { rmfamily } { \xeCJK@family { \CJKrmdefault } }
4685   \ctex_gadd_ltxhook:nn { sffamily } { \xeCJK@family { \CJKsfdefault } } 4686
4686   \ctex_gadd_ltxhook:nn { ttfamily } { \xeCJK@family { \CJKttdefault } }
4687   \ctex_gadd_ltxhook:nn { normalfont } { \xeCJK@family { \CJKfamilydefault } }
4688 }
4689 {
4690   \cs_if_exist:NTF \@rmfamilyhook
4691   {
4692     \cs_set_eq:NN \xeCJK@family \xeCJK_switch_family:e
4693     \g@addto@macro \@rmfamilyhook { \xeCJK@family { \CJKrmdefault } }
4694     \g@addto@macro \@sffamilyhook { \xeCJK@family { \CJKsfdefault } }
4695     \g@addto@macro \@ttfamilyhook { \xeCJK@family { \CJKttdefault } }
4696     \exp_args:Nc \g@addto@macro
4697     {
4698       \cs_if_exist:NTF \@defaultfamilyhook
4699       { \@defaultfamilyhook } { normalfont ~ }
4700     }
4701     { \xeCJK@family { \CJKfamilydefault } }
4702   }
4703 }
4704 \RenewDocumentCommand \fontfamily { m }
4705 {
4706   \tl_set:Nx \f@family {#1}
4707   \xeCJK@fontfamily {#1}
4708 }
4709 \cs_new_protected:Npn \xeCJK@fontfamily #1
4710 {
4711   \str_if_eq:nnTF {#1} { \familydefault }
4712   { \xeCJK_switch_family:e { \CJKfamilydefault } }
4713   { \xeCJK_update_family_aux: }
4714 }
4715 \cs_new_protected:Npn \xeCJK_update_family_aux:
4716 {
4717   \str_case_e:nn { \f@family }
4718   {
4719     { \rmdefault }      { \xeCJK_switch_family:e { \CJKrmdefault } }
4720     { \sfdefault }      { \xeCJK_switch_family:e { \CJKsfdefault } }
4721     { \ttdefault }      { \xeCJK_switch_family:e { \CJKttdefault } }

```

```

4722             {\familydefault}{\xeCJK_switch_family:e{\CJKfamilydefault}}
4723         }
4724     }
4725 }
4726 }
4727 <@@=>

```

`\xeCJK@fix@penalty` to LATEX 2 ϵ kernel `\fix@penalty` is used in the definition of document font conversion commands such as `\textit`. The purpose of patching it here is to fix the skew correction and make it possible to insert `\CJKecglue` correctly between these document commands and the immediately following characters or to ignore spaces in them. For example, if this is `\emph{emphasis}` ~~the~~ the second space can be ignored. If you use the `xCJKecglue` option, the first space can also be omitted. In fact, there are four cases of `\lastskip` and `\lastpenalty` preceding `\@@italiccorr` in the definition of `\sw@slant`, and only the cases where they are both zero are treated here.

```

4728 \cs_new_eq:NN \xeCJK@fix@penalty \fix@penalty
4729 \tl_replace_once:Nnn \xeCJK@fix@penalty { \@@italiccorr } { \xeCJK@italiccorr }
4730 \tl_replace_once:Nnn \sw@slant { \fix@penalty } { \xeCJK@fix@penalty }

```

`\xeCJK@italiccorr` Fix skew correction and handle spaces after Chinese characters.

```

4731 \cs_new_protected:Npn \xeCJK@italiccorr
4732 {
4733     \int_compare:nNnTF \tex_XeTeXinterchartokenstate:D > \c_zero_int
4734     { \xeCJK_italic_correction: }
4735     { \@@italiccorr }
4736 }
4737 <@@=xeCJK>

```

`\xeCJK_italic_correction:` Fix skew correction and handle spaces after Chinese characters.

```

4738 \cs_new_protected:Npn \xeCJK_italic_correction:
4739 { \xeCJK_if_last_kern:T { \xeCJK_italic_correction: } }
4740 \cs_new_protected:Npn \xeCJK_italic_correction:
4741 {
4742     \dim_case:nnF { \tex_lastkern:D }
4743     {
4744         { \xeCJK_node:n { default } }
4745         {
4746             \xeCJK_remove_node:\tex_italiccorrection:D
4747             \xeCJK_make_node:n { default }
4748         }
4749         { \xeCJK_node:n { CJK } }
4750         {
4751             \xeCJK_remove_node:\tex_italiccorrection:D
4752             \xeCJK_make_node:n { CJK }
4753             \xeCJK_italic_correction_aux:
4754         }
4755         { \xeCJK_node:n { CJK-space } }
4756         {
4757             \xeCJK_remove_node:\tex_italiccorrection:D
4758             \xeCJK_make_node:n { CJK-space }
4759             \xeCJK_italic_correction_aux:
4760         }
4761     }
4762     { \tex_italiccorrection:D }
4763 }

```

`\xeCJK_ignore_spaces:w` uses the peek function to determine if there are spaces after it, and at this time there are 4 `\fi` or `\else` after it... `\fi` is not expanded, it will affect the peek function's judgment. So we need to use $2^4 - 1 = 15$ `\exp_after:wN` to expand them. Obviously, it would be easier to use

`\exp_last_unbraced:Nf` here, but it would eat up the spaces after `\textit{...}` and so on followed by the spaces that originally existed as the end of the full expansion. To use it correctly requires additional `\msg` (using `\exp_stop_f:`)

4764 `\cs_new_protected:Npn \xeCJK_italic_correction_aux:`

```

4765 {
4766     \exp_after:wN \exp_after:wN \exp_after:wN
4767     \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
4768     \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
4769     \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
4770     \xeCJK_ignore_spaces:w
4771 }

```

`\xeCJK_xetex_allocator_int` LATEX 2_ε 2015/01/01 took over `\newXeTeXintercharclass`.

```
4772 \cs_new_eq:NN \g_xeCJK_xetex_allocator_int \xe@alloc@intercharclass
```

`\xeCJK_set_others_toks:n` simply handles compatibility with macro packages that also use the `\XeTeXinterchartoks` mechanism.

```

4773 \xeCJK_after_end_preamble:n
4774 {
4775     \int_compare:nNnF
4776     { \c_xeCJK_class_begin_int + \seq_count:N \g_xeCJK_new_class_seq } =
4777     { \g_xeCJK_xetex_allocator_int }
4778     {
4779         \int_step_inline:nnn
4780         { \c_xeCJK_class_begin_int + 1 }
4781         { \g_xeCJK_xetex_allocator_int }
4782         {
4783             \seq_if_in:NnF \g_xeCJK_new_class_seq {#1}
4784             { \xeCJK_set_others_toks:n {#1} }
4785         }
4786     }
4787 }
4788 \cs_new_protected:Npn \xeCJK_set_others_toks:n #1
4789 {
4790     \int_set:cn { \xeCJK_class_csname:n { Others } } {#1}
4791     \seq_map_inline:Nn \g_xeCJK_CJK_class_seq
4792     {
4793         \xeCJK_copy_inter_class_toks:nnnn {##1} { Others } {##1} { NormalSpace }
4794         \xeCJK_copy_inter_class_toks:nnnn { Others } {##1} { NormalSpace } {##1}
4795         \xeCJK_app_inter_class_toks:nne {##1} { Others }
4796         { \xeCJK_get_inter_class_toks:nn { Default } { Others } }
4797         \xeCJK_pre_inter_class_toks:nne { Others } {##1}
4798         { \xeCJK_get_inter_class_toks:nn { Others } { Default } }
4799         \tl_if_blank:eT
4800         { \xeCJK_get_inter_class_toks:nn { Others } { Boundary } }
4801         {
4802             \xeCJK_copy_inter_class_toks:nnn
4803             { Others } { Boundary } { Default } { Boundary }
4804         }
4805         \tl_if_blank:eT
4806         { \xeCJK_get_inter_class_toks:nn { Boundary } { Others } }
4807         {
4808             \xeCJK_copy_inter_class_toks:nnn
4809             { Boundary } { Others } { Boundary } { Default }
4810         }
4811     }
4812 }

```

`\xeCJK_inactive_group_begin:` The group used to protect the following disambiguation width punctuation.
`\xeCJK_inactive_group_end:`

```

4813 \cs_new_protected:Npn \xeCJK_inactive_group_begin:
4814     { \group_begin: \makexeCJKinactive }
4815 \cs_new_eq:NN \xeCJK_inactive_group_end: \group_end:

```

`\xeCJK_patch_text_command:` Individually handle several punctuation marks with divergent widths: including ellipses, dashes, spacers, quotation marks and other symbols mixed with Chinese and Western languages, and keep

`\xeCJK_ambiguous_char_prop` proves that its command form output is western style. If `xunicode` macro package is loaded, it is processed by `xunicode-addon`.

```

4816 \prop_const_from_keyval:Nn \c_xeCJK_ambiguous_char_prop
4817 {
4818     "00B7 = \textperiodcentered \textcentereddot \textcdot ,

```



```

4820 "2014 = \textemdash ,
4821 "2018 = \textquoteleft \textgrq ,
4822 "2019 = \textquoteright ,
4823 "201C = \textquotedblleft \textgrqq ,
4824 "201D = \textquotedblright ,
4825 "2025 = \texthdotfor ,
4826 "2026 = \textellipsis ,
4827 "2027 = \textthyphenationpoint ,
4828 "2E3A = \texttwoemdash
4829 }
4830 \xeCJK_at_end_preamble:n { \xeCJK_patch_text_command: }
4831 \cs_new_protected:Npn \xeCJK_patch_text_command:
4832 {
4833   \xeCJK_if_package_loaded:nTF { xunicode }
4834   { \xeCJK_patch_xunicode_ambiguous_char: }
4835   {
4836     \exp_args:Ne \xeCJK_patch_tuenc_ambiguous_char:n
4837     { \UnicodeEncodingName }
4838     \xeCJK_patch_tuenc_accent:
4839     \xeCJK_patch_tuenc_composite:
4840   }
4841 }
4842 \cs_new_protected:Npn \xeCJK_patch_xunicode_ambiguous_char:
4843 {
4844   \RequirePackage { xunicode-addon }
4845   \prop_map_inline:Nn \c xeCJK_ambiguous_char_prop
4846   {
4847     \tl_map_inline:nn { ##2 }
4848     {
4849       \xunadd_set_begin_hook:nn { ####1 }
4850       { \xeCJK_inactive_group_begin: }
4851       \xunadd_set_end_hook:nn { ####1 }
4852       { \xeCJK_inactive_group_end: }
4853     }
4854   }
4855   \xunadd_append_begin_hook:n { \xeCJK_make_boundary: }
4856 }
4857 \cs_new_protected:Npn \xeCJK_patch_tuenc_ambiguous_char:n #1
4858 {
4859   \prop_map_inline:Nn \c xeCJK_ambiguous_char_prop
4860   {
4861     \tl_map_inline:nn { ##2 }
4862     {
4863       \cs_if_exist:NF ####1
4864       { \DeclareTextSymbol ####1 { ##1 } { ##1 } }
4865       \xeCJK_patch_ambiguous_char:nN {#1} ####1
4866     }
4867   }
4868 }
4869 \cs_new_protected:Npn \xeCJK_patch_ambiguous_char:nN #1#2
4870 {
4871   \exp_args:Ne \xeCJK_patch_ambiguous_char:nn
4872   { #1 \token_to_str:N #2 }
4873   { #1 - #2 }
4874 }
4875 \cs_new_protected:Npx \xeCJK_patch_ambiguous_char:nNn #1#2#3
4876 {
4877   \exp_not:N \exp_args:Ne
4878   \exp_not:N \xeCJK_patch_ambiguous_char:nn
4879   {
4880     \c_backslash_str #1
4881     \exp_not:N \token_to_str:N #2 -
4882     \exp_not:N \token_to_str:N #3
4883   }
4884   { #1 - #2#3 }
4885 }
4886 \cs_new_protected:Npn \xeCJK_patch_ambiguous_char:nn #1#2

```

```

4887 {
4888   \cs_if_free:cF {#1}
4889   { \exp_args:Nc \xeCJK_patch_ambiguous_char:Nn {#1} {#2} }
4890 }
4891 \cs_new_protected:Npn \xeCJK_patch_ambiguous_char:Nn #1#2
4892 {
4893   \token_if_chardef:NTF #1
4894   {
4895     \prop_gput:Nne \c_xeCJK_ambiguous_slot_prop {#2}
4896     { \int_eval:n {#1} }
4897     \cs_set_protected:Npx #1
4898     { \xeCJK_ambiguous_char:n { \tex_Uchar:D #1 } }
4899   }
4900   {
4901     \prop_gput:Nne \c_xeCJK_ambiguous_slot_prop {#2}
4902     { \int_eval:n { \exp_after:wN ` #1 } }
4903     \cs_set_protected:Npx #1
4904     { \xeCJK_ambiguous_char:n { \exp_not:o {#1} } }
4905   }
4906 }
4907 \cs_new_protected:Npn \xeCJK_ambiguous_char:n #1
4908 {
4909   \int_compare:nNnTF \tex_XeTeXinterchartokenstate:D > \c_zero_int
4910   { \xeCJK_inactive_group_begin: #1 \xeCJK_inactive_group_end: }
4911   {#1}
4912 }
4913 \prop_new:N \c_xeCJK_ambiguous_slot_prop

```

`\xeCJK_patch_tuenc_composite:` `\DeclareUnicodeComposite` has the function of checking whether the character exists or not, when the symbol command follows the CJK character class, it needs to make the font return to the western state

```

4914 \cs_new_protected:Npn \xeCJK_text_composite_patch:
4915 {
4916   \str_if_eq:eeT { \f@encoding } { \UnicodeEncodingName }
4917   { \xeCJK_make_boundary: }
4918 }

```

Note that `\xeCJK_text_composite_patch:` may end the grouping, resulting in `\undefined` when `##1` is not defined.

It is not `\relax`, so it cannot be compared with `\relax`.

```

4919 \cs_new_protected:Npn \xeCJK_patch_tuenc_composite:
4920 {
4921   \cs_set_nopar:Npn \@text@composite@x
4922   {
4923     \xeCJK_text_composite_patch:
4924     \cs_if_exist_use:NF
4925   }
4926 }

```

`\xeCJK_patch_tuenc_accent:` `\add@unicode@accent` Define the last `\relax` used to truncate the numeric expansion will cause the boundary, which may affect the combination marker.

```

4927 \group_begin:
4928 \char_set_catcode_other:n { "A0 }
4929 \cs_new_protected:Npn \xeCJK_patch_tuenc_accent:
4930 {
4931   \cs_set_protected_nopar:Npn \add@unicode@accent ##1 ##2
4932   {
4933     \tl_if_blank:nTF { ##2 } { ^^a0 } { ##2 }
4934     \tex_Uchar:D \tex_numexpr:D ##1 \scan_stop:
4935   }
4936 }
4937 \group_end:

```

`\xeCJK_patch_middle_dot:` `U+00B7`, which is often used as Chinese spacer, conflicts with the symbol command defined under old font codes such as T1. In `encguide.pdf`

The following definitions in the code symbol table of `\cxeCJK_middle_dot_prop` are in conflict.

```

\DeclareTextComposite{\r}{T1}{u}{183}
\DeclareTextSymbol{\cyrchvcrs}{T2A}{183}
\DeclareTextSymbol{\cyrchldsc}{T2B}{183}
\DeclareTextSymbol{\cyrabhha}{T2C}{183}
\DeclareTextSymbol\textviby{T3}{183}
\DeclareTextComposite{\B}{T4}{t}{183}
\DeclareTextComposite{\}{T5}{\ecircumflex}{183}
\DeclareTextDoubleComposite{\}{T5}{\^}{e}{183}
\DeclareTextSymbol{\textperiodcentered}{TS1}{183}
\DeclareTextSymbol{\cyrchldsc}{X2}{183}
\DeclareTextSymbol{\textperiodcentered}{LY1}{183}

```

The symbol table for the LGR code has 183 characters, but the corresponding symbol command is not found in `lgrenc.def`.

```

4938 \prop_const_from_keyval:Nn \c xecJK_middle_dot_prop
4939 {
4940   T2A = \cyrchvcrs ,
4941   T2B = \cyrchldsc ,
4942   T2C = \cyrabhha ,
4943   X2 = \cyrchldsc ,
4944   TS1 = \textperiodcentered ,
4945   LY1 = \textperiodcentered ,
4946   T1 = \r u ,
4947   T4 = \B t ,
4948   T5 = \ \ecircumflex
4949 }
4950 \xecJK_at_end_preamble:n { \xecJK_patch_middle_dot: }
4951 \cs_new_protected:Npn \xecJK_patch_middle_dot:
4952 {
4953   \prop_map_inline:Nn \c xecJK_middle_dot_prop
4954     { \xecJK_patch_middle_dot:nw { ##1 } ##2 \q_stop } 4955
4955     \xecJK_patch_ambiguous_char:nNn { T5 } \ { \^ - e } 4956
4957 \cs_new_protected:Npn \xecJK_patch_middle_dot:nw #1#2#3 \q_stop
4958 {
4959   \tl_if_empty:nTF {#3}
4960     { \xecJK_patch_ambiguous_char:nN {#1} #2 }
4961     { \xecJK_patch_ambiguous_char:nNn {#1} #2 {#3} }
4962 }

```

The symbol `\ding{183}` of the `pifont` macro package also has a conflict.

```

4963 \xecJK_package_hook:nn { pifont }
4964 {
4965   \RenewDocumentCommand \Pifont { m }
4966     { \makexecJKinactive \usefont { U } {#1} { m } { n } }
4967 }

```

`\xecJK_save_um_char:` Compatible with `unicode-math` and `CJKmath` options to avoid setting some Chinese and Western punctuation to CJK font.

```

\xecJK_save_um_char:
4968 \xecJK_package_hook:nn { unicode-math }
4969 {
4970   \prop_const_from_keyval:Nn \c xecJK_um_ambiguous_char_prop
4971   {
4972     "00B7 = \cdotp ,
4973     "2025 = \enleadertwodots ,
4974     "2026 = \unicodeellipsis
4975   }
4976   \cs_new_protected:Npn \xecJK_save_um_char:
4977   {
4978     \cs_set_protected:Npx \xecJK_restore_um_char:
4979     {
4980       \prop_map_function:NN
4981         \c xecJK_um_ambiguous_char_prop
4982         \xecJK_restore_um_char_aux:nn
4983     }
4984   }
4985   \cs_new_eq:NN \xecJK_restore_um_char: \prg_do_nothing:

```

```

4986 \cs_new:Npn \xeCJK_restore_um_char_aux:nn #1#2
4987 {
4988   \xeCJK_gset_mathcodenum:nn
4989   { \int_value:w #1 }
4990   { \int_value:w \tex_Umathcodenum:D #1 }
4991 }
4992 \cs_new_protected:Npn \xeCJK_gset_mathcodenum:nn #1#2
4993 {
4994   \int_compare:nNnF { \tex_Umathcodenum:D #1 } = {#2}
4995   { \tex_global:D \tex_Umathcodenum:D #1 = #2 ~ }
4996 }
4997 }

```

`\xeCJK_patch_microtype_get_slot:` Compatible with `microtype`.

```

4998 \cs_new_protected:Npn \xeCJK_patch_microtype_get_slot:
4999 {
5000   \cs_new_eq:NN \xeCJK@original@get@slot \MT@get@slot@
5001   \cs_set_eq:NN \MT@get@slot@ \xeCJK@microtype@get@slot
5002   \cs_set_eq:NN \MT@warn@unknown@once \use_none:n
5003 }
5004 \cs_new_protected_nopar:Npn \xeCJK@microtype@get@slot
5005 {
5006   \int_compare:nNnT \MT@char < \c_zero_int
5007   { \xeCJK_get_ambiguous_slot: }
5008   \xeCJK@original@get@slot
5009 }
5010 \cs_new_protected:Npn \xeCJK_get_ambiguous_slot:
5011 {
5012   \prop_get:NeNT \c xeCJK_ambiguous_slot_prop
5013   { \MT@encoding - \tex_the:D \MT@toks } \l xeCJK_tmp_tl
5014   { \cs_set_eq:NN \MT@char \l xeCJK_tmp_tl }
5015 }
5016 \cs_new_protected:Npn \xeCJK@microtype@restore@pickupfont
5017 { \xeCJK_gadd_font_initial_hook:n { \MT@ltx@pickupfont }
5018 \xeCJK_package_hook:nn { microtype }
5019 {
5020   \cs_if_free:NF \MT@get@slot@
5021   { \xeCJK_patch_microtype_get_slot: }
5022   \MT@addto@setup { \xeCJK@microtype@restore@pickupfont }
5023 }

```

Simple handling of compatibility issues with `hyperref` macro packages.

```

5024 \xeCJK_package_hook:nn { hyperref }
5025 {
5026   \pdfstringdefDisableCommands
5027   {
5028     \xeCJK_gobble_CJKfamily:
5029     \xeCJK_cs_clear:N \xeCJK_inactive_group_begin:
5030     \xeCJK_cs_clear:N \xeCJK_inactive_group_end:
5031     \xeCJK_cs_clear:N \makexeCJKinactive
5032     \xeCJK_cs_clear:N \xeCJK_text_composite_patch:
5033   }
5034 }

```

When the `cprotect` macro package is detected to be introduced, the `\outer` definition of the `\cprotect` macro is cancelled.

```

5035 \xeCJK_package_hook:nn { cprotect }
5036 {
5037   \cs_if_free:NF \icprotect
5038   { \exp_after:wN \tex_let:D \cs:w cprotect \cs_end: \icprotect }
5039 }

```

Automatically load `xeCJK-listings` after the `listings` macro package.

```

5040 \xeCJK_package_hook:nn { listings }
5041 { \RequirePackage { xeCJK-listings } }

```

Since `xeCJK` pretending to be `CJK` has been introduced, this may cause old versions of `everysel` packages to be judged incorrectly. You need to undefine them before they are judged.

```
5042 \xeCJK_package_hook:nn { everysel }
5043 {
5044   \cs_if_exist:NF \@EverySelectfont@Legacy
5045   { \cs_undefine:c { ver@CJK . \c xeCJK_package_ext_tl } }
5046 }
```

`\CJKaddEncHook` makes some processing for using `CJKnumb` macro package. In addition, `CJKnumb` uses the traditional Chinese characters “萬” and “億”, which we modify here to be simplified characters.

```
5047 \ctex_at_begin_package:nn { CJKnumb }
5048 {
5049   \tl_new:N \l xeCJK_CJK_version_tl
5050   \tl_set_eq:Nc \l xeCJK_CJK_version_tl { ver@CJK . \c xeCJK_package_ext_tl }
5051   \tl_set:cn { ver@CJK . \c xeCJK_package_ext_tl } { 9999/99/99 }
5052   \cs_new_protected:Npn \CJKaddEncHook #1#2
5053   {
5054     \str_if_eq:nnT {#1} { \CJK@UnicodeEnc }
5055     {
5056       \group_begin:
5057       \cs_set_eq:NN \Unicode \xeCJK_unicode_char:nn
5058       \cs_set_eq:NN \def \xdef
5059       #2
5060       \group_end:
5061       \str_gset:Nn \CJK@tenthousand { ^^^^4e07 }
5062       \str_gset:Nn \CJK@hundredmillion { ^^^^4ebf }
5063       \tl_if_exist:NF \CJK@UnicodeEnc
5064       { \tl_const:Nn \CJK@UnicodeEnc { UTF8 } }
5065       \cs_if_exist:NF \Unicode
5066       { \cs_new_eq:NN \Unicode \xeCJK_unicode_char:nn n }
5067     }
5068   }
5069   \cs_new:Npn \xeCJK_unicode_char:nn #1#2
5070   { \tex_Uchar:D \tex_numexpr:D (#1) * 256 + (#2) \scan_stop: }
5071 }
5072 \ctex_at_end_package:nn { CJKnumb }
5073 { \tl_set_eq:cN { ver@CJK . \c xeCJK_package_ext_tl } \l xeCJK_CJK_version_tl }
```

Finally the local configuration file is introduced.

```
5074 \bool_if:NT \g xeCJK_config_bool
5075 {
5076   \ExplSyntaxOff
5077   \file_input:n { \g xeCJK_config_name_tl .cfg }
5078   \ExplSyntaxOn
5079 }
5080 </package>
```

5.19 `xeCJKfntef`

```
5081 <*/fntef>
5082 \PassOptionsToPackage { normalem } { ulem }
5083 \DeclareOption* { \PassOptionsToPackage { \CurrentOption } { ulem } }
5084 \ProcessOptions \scan_stop:
5085 \RequirePackage { xeCJK }
5086 \RequirePackage { ulem }
5087 \addto@hook \UL@hook { \xeCJK_hook_for_ulem: }
\xeCJK_hook_for_ulem: 5088 \cs_new_protected:Npn \xeCJK_hook_for_ulem:
5089 {
5090   \xeCJK_ulem_detect_node:
5091   \l xeCJK_ulem_text_format_tl
```



```

5093     {
5094         \bool_set_true:N \l_xeCJK_ulem_hook_used_bool
5095         \xeCJK_ulem_hook:
5096     }
5097     \xeCJK_ulem_begin_node:
5098 }
5099 \cs_new_protected:Npn \xeCJK_ulem_hook:
5100 {
5101     \xeCJK_ulem_initial:
5102     \bool_if:NT \l_xeCJK_ulem_subtract_bool
5103     {
5104         \xeCJK_swap_cs:NN \UL@leaders \xeCJK_ulem_leaders:
5105         \cs_set_eq:NN \xeCJK_ulem_var_leaders: \xeCJK_ulem_var_leaders:
5106         \cs_set_eq:NN \xeCJK_ulem_right_skip: \xeCJK_ulem_right_skip: 5107
5107     }
5108     \bool_if:NT \l_xeCJK_ulem_hidden_bool
5109     { \cs_set_eq:NN \UL@putbox \xeCJK_ulem_hidden_box: }
5110     \bool_if:NTF \l_xeCJK_ulem_skip_bool
5111     {
5112         \cs_set_eq:NN \xeCJK_ulem_putbox: \UL@putbox
5113         \cs_set_eq:NN \xeCJK_ulem_hskip_aux:n \xeCJK_ulem_hskip:n
5114     }
5115     {
5116         \xeCJK_swap_cs:NN \xeCJK_punct_hskip:n \xeCJK_ulem_punct_hskip:n
5117         \xeCJK_cs_clear:N \xeCJK_ulem_skip_punct_begin:
5118         \xeCJK_cs_clear:N \xeCJK_ulem_skip_punct_end:
5119     }
5120     \xeCJK_glue_to_skip:nN
5121     {
5122         \cs_set_eq:NN \ \tex_space:D
5123         \cs_set_eq:NN \penalty \tex_penalty:D
5124         \cs_set_eq:NN \hskip \skip_horizontal:N
5125         \CJKglue
5126     } \l_xeCJK_ccglue_skip
5127     \xeCJK_glue_to_skip:nN
5128     {
5129         \cs_set_eq:NN \ \tex_space:D
5130         \cs_set_eq:NN \penalty \tex_penalty:D
5131         \cs_set_eq:NN \hskip \skip_horizontal:N
5132         \CJKecglue
5133     } \l_xeCJK_ecglue_skip
5134     \xeCJK_glue_to_skip:nN { \xeCJK_space_glue: } \l_xeCJK_space_skip
5135     \cs_set_protected:Npn \CJKglue
5136     { \xeCJK_ulem_glue:n \l_xeCJK_ccglue_skip }
5137     \cs_set_protected:Npn \CJKecglue
5138     { \xeCJK_ulem_glue:n \l_xeCJK_ecglue_skip }
5139     \cs_set_protected:Npn \xeCJK_space_glue:
5140     { \xeCJK_ulem_glue:n \l_xeCJK_space_skip }
5141     \cs_set_eq:NN \xeCJK_punct_node:N \use_none:n
5142     \cs_set_eq:NN \xeCJK_if_last_punct:TF \use_ii:nn
5143     \keys_set:nn { xeCJK / options }
5144     { CheckFullRight = false , xCJKecglue = false }
5145 }
5146 \skip_new:N \l_xeCJK_space_skip
5147 \bool_new:N \l_xeCJK_ulem_hook_used_bool

```

\UL@word Modify \UL@word, in order to get \UL@leadtype in the grouping to add \xeCJK_ulem_right_skip:.

```

\xeCJK_ulem_word^nw 5148 \cs_new_protected:Npn \xeCJK_ulem_word:nw #1 ~
5149 {
5150     \xeCJK_ulem_start:w #1 ~
5151     \exp_after:wN \if_meaning:w \exp_after:wN \UL@end #1
5152     \exp_after:wN \xeCJK_ulem_end:
5153     \else:
5154         \exp_after:wN \xeCJK_ulem_loop:nw
5155     \fi:
5156 }
5157 \cs_new_protected:Npn \xeCJK_ulem_end:

```

```

5158 {
5159     \c_group_end_token
5160     \c_group_end_token
5161     \tex_unskip:D \tex_unskip:D \tex_unskip:D
5162     \xeCJK_ulem_right_skip:
5163     \xeCJK_ulem_group_end:
5164     \xeCJK_ulem_right_node:
5165     \int_set:Nn \tex_spacefactor:D { \UL@spfactor }
5166 }
5167 \cs_new_protected:Npn \xeCJK_ulem_loop:nw
5168 {
5169     \reverse_if:N \if_mode_math:
5170     \reverse_if:N \if_dim:w \tex_lastskip:D = \c_zero_dim
5171     \skip_gset_eq:NN \UL@skip \tex_lastskip:D
5172     \tex_unskip:D
5173     \UL@stop \UL@leaders
5174     \fi:
5175     \fi:
5176     \xeCJK_ulem_word:nw \prg_do_nothing:
5177 }
5178 \cs_new_protected:Npn \xeCJK_ulem_start:w
5179 { \exp_after:wN \UL@start }
5180 \cs_set_eq:NN \UL@word \xeCJK_ulem_word:nw

```

`\xeCJK_ulem_left:` detect the previous `node` before the start of underscore, so that `\CJKglue` or `\CJKecglue` can be inserted later.

```

\xxeCJK_ulem_detect_node: 5181 \cs_new_protected:Npn \xeCJK_ulem_left:
5182 {
5183     \xeCJK_ulem_left_node:
5184     \xeCJK_make_group_tag:
5185 }
5186 \cs_new_eq:NN \xeCJK_ulem_left_node: \prg_do_nothing:
5187 \cs_new_protected:Npn \xeCJK_ulem_detect_node:
5188 {
5189     \scan_stop:
5190     \dim_compare:nNnTF \tex_lastkern:D = \c_zero_dim
5191     {
5192         \xeCJK_cs_clear:N \xeCJK_ulem_left_node:
5193         \xeCJK_cs_clear:N \xeCJK_ulem_begin_node:
5194         \cs_set_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip:n
5195     }
5196     {
5197         \dim_set_eq:NN \l_xeCJK_tmp_dim \tex_lastkern:D
5198         \tex_unkern:D
5199         \dim_compare:nNnTF \tex_lastkern:D = { - \l_xeCJK_tmp_dim }
5200         {
5201             \tex_unkern:D
5202             \cs_set_protected:Npx \xeCJK_ulem_left_node:
5203             {
5204                 \tex_kern:D - \dim_use:N \l_xeCJK_tmp_dim \exp_stop_f:
5205                 \tex_kern:D \dim_use:N \l_xeCJK_tmp_dim \exp_stop_f:
5206             }
5207             \cs_set_protected:Npn \xeCJK_ulem_begin_node:
5208             { { \xeCJK_make_node:n { ulem-begin } } }
5209             \cs_set_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip_first:n
5210         }
5211         {
5212             \tex_kern:D \l_xeCJK_tmp_dim
5213             \xeCJK_cs_clear:N \xeCJK_ulem_left_node:
5214             \xeCJK_cs_clear:N \xeCJK_ulem_begin_node:
5215             \cs_set_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip:n
5216         }
5217     }
5218 }
5219 \xeCJK_declare_node:n { ulem-begin }
5220 \cs_new_eq:NN \xeCJK_ulem_begin_node: \prg_do_nothing:

```

`\xeCJK_ulem_hskip_first:n` If the first call of `\CJKglue` or `\CJKecglue` is generated by the first text in the underscore and the previous content, it

There is no need to underline.

```

5221 \cs_new_protected:Npn \xeCJK_ulem_hskip_first:n #1
5222   {
5223     \xeCJK_if_last_node:nTF { ulem-begin }
5224     {
5225       \xeCJK_remove_node:
5226       \skip_horizontal:n {#1}
5227     }
5228     { \xeCJK_ulem_hskip:n {#1} }
5229     \cs_set_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip:n
5230   }
5231 \cs_new_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip_first:n
5232 \cs_new_protected:Npn \xeCJK_ulem_hskip:n #1
5233   { { \skip_set:Nn \UL@skip {#1} \UL@leaders } }

```

`\xeCJK_ulem_right:` Save the node at the last position of the underscore.
`\xeCJK_ulem_right_node:`

```

5234 \cs_new_protected:Npn \xeCJK_ulem_right:
5235   {
5236     \scan_stop:
5237     \dim_compare:nNnTF \tex_lastkern:D = \c_zero_dim
5238     { \xeCJK_cs_gclear:N \xeCJK_ulem_right_node: }
5239     {
5240       \dim_compare:nNnTF \tex_lastkern:D = { 3sp }
5241       { \xeCJK_cs_gclear:N \xeCJK_ulem_right_node: }
5242       {
5243         \exp_args:No \tex_unkern:D
5244         \xeCJK_ulem_right_aux:n { \dim_use:N \tex_lastkern:D }
5245       }
5246     }
5247   }
5248 \cs_new_protected:Npn \xeCJK_ulem_right_aux:n #1
5249   {
5250     \dim_compare:nNnTF \tex_lastkern:D = { - #1 }
5251     {
5252       \tex_unkern:D
5253       \cs_gset_protected:Npn \xeCJK_ulem_right_node:
5254       {
5255         \tex_kern:D - #1 \exp_stop_f:
5256         \tex_kern: D#1 \exp_stop_f:
5257       }
5258       \tl_gset:Nx \UL@spfactor { \int_use:N \tex_spacefactor:D }
5259     }
5260     {
5261       \tex_kern:D #1 \exp_stop_f:
5262       \xeCJK_cs_gclear:N \xeCJK_ulem_right_node:
5263     }
5264   }
5265 \cs_new_eq:NN \xeCJK_ulem_right_node: \prg_do_nothing:

```

`\xeCJK_ulem_var_leaders:` When drawing underline for the first time, it is not necessary to pan to the left `\UL@pixel` but the left side have spacing.

```

5266 \cs_new_protected:Npn \xeCJK_ulem_leaders:
5267   { \xeCJK_ulem_var_leaders: }
5268 \cs_new_protected:Npn \xeCJK_ulem_var_leaders:
5269   {
5270     \scan_stop:
5271     \skip_if_eq:nnF { \UL@skip } { \c_zero_skip }
5272     {
5273       \UL@leadtype \skip_horizontal:n { \UL@skip + \UL@pixel }
5274       \skip_horizontal:n { - \UL@pixel }
5275       \cs_gset_eq:NN \xeCJK_ulem_var_leaders: \xeCJK_ulem_leaders:
5276     }
5277   }
5278 \cs_new_eq:NN \xeCJK_ulem_var_leaders: \xeCJK_ulem_var_leaders:

```

`\xeCJK_ulem_right_skip`: After the underscore is completely drawn, we check the last case. Use `\unskip` to remove the last underline, and redraw one with reduced `\UL@pixel`.

```

5279 \cs_new_eq:NN \xeCJK_ulem_right_skip: \prg_do_nothing:
5280 \cs_new_protected:Npn \xeCJK_ulem_right_skip:
5281   {
5282     \int_case:nn { \tex_lastnodetype:D }
5283     {
5284       { \c xeCJK_hlist_node }      { \xeCJK_ulem_right_skip_hbox: } 5285
5285       { \c xeCJK_glue_node }      { \c xeCJK_ulem_right_skip_glue: } 5286
5286       { \c xeCJK_penalty_node } { \xeCJK_ulem_right_skip_penalty: }
5287     }
5288   }
5289 \cs_new_protected:Npn \xeCJK_ulem_right_skip_hbox:
5290   {
5291     \box_set_to_last:N \l xeCJK_tmp_box
5292     \xeCJK_if_last_kern:TF
5293     { \xeCJK_ulem_right_skip_kern: }
5294     { \xeCJK_ulem_right_skip_glue: }
5295     \box_use_drop:N \l xeCJK_tmp_box
5296   }
5297 \cs_new_protected:Npn \xeCJK_ulem_right_skip_kern:
5298   {
5299     \dim_set:Nn \l xeCJK_tmp_dim { - \box_wd:N \l xeCJK_tmp_box }
5300     \dim_compare:nNnT \tex_lastkern:D = \l xeCJK_tmp_dim
5301     {
5302       \tex_unkern:D
5303       \xeCJK_ulem_right_skip_glue:
5304       \tex_kern:D \l xeCJK_tmp_dim
5305     }
5306   }
5307 \cs_new_protected:Npn \xeCJK_ulem_right_skip_glue:
5308   {
5309     \skip_if_eq:nnT { \tex_lastskip:D } { - \UL@pixel }
5310     {
5311       \tex_unskip:D
5312       \skip_set:Nn \l xeCJK_tmp_skip { \tex_lastskip:D - \UL@pixel }
5313       \tex_unskip:D
5314       \UL@leadtype \skip_horizontal:N \l xeCJK_tmp_skip
5315     }
5316   }
5317 \cs_new_protected:Npn \xeCJK_ulem_right_skip_penalty:
5318   {
5319     \int_set_eq:NN \l xeCJK_tmp_int \tex_lastpenalty:D
5320     \tex_unpenalty:D
5321     \xeCJK_if_last_hlist:T
5322     { \xeCJK_ulem_right_skip_hbox: }
5323     \tex_penalty:D \l xeCJK_tmp_int
5324   }

```

`\xeCJK_ulem_hidden_box`: Draw only the line, do not output the box.

```

5325 \cs_new_protected:Npn \xeCJK_ulem_hidden_box:
5326   {
5327     \tl_if_empty:NF \UL@start
5328     {
5329       \box_set_ht:Nn \l xeCJK_hidden_box { \box_ht:N \UL@box } 5330
5330       \box_set_dp:Nn \l xeCJK_hidden_box { \box_dp:N \UL@box }
5331       \box_use:N \l xeCJK_hidden_box
5332       \xeCJK_no_break:
5333       \xeCJK_ulem_hskip:n { \box_wd:N \UL@box }
5334       \box_use:N \l xeCJK_hidden_box
5335     }
5336   }
5337 \box_new:N \l xeCJK_hidden_box
5338 \hbox_set:Nn \l xeCJK_hidden_box {}

```

`\xeCJK_ulem_skip_punct_begin`: Let the underscore skip the punctuation setting.
`\xeCJK_ulem_skip_punct_end`:

```

5339 \cs_new_protected:Npn \xeCJK_ulem_skip_punct_begin:
5340   {
5341     \cs_set_eq:NN \UL@putbox \xeCJK_ulem_skip_putbox:
5342     \cs_set_eq:NN \xeCJK_ulem_hskip:n \skip_horizontal:n
5343   }
5344 \cs_new_protected:Npn \xeCJK_ulem_skip_punct_end:
5345   {
5346     \cs_set_eq:NN \UL@putbox \xeCJK_ulem_putbox:
5347     \cs_set_eq:NN \xeCJK_ulem_hskip:n \xeCJK_ulem_hskip_aux:n
5348   }
5349 \cs_new_eq:NN \xeCJK_ulem_putbox: \UL@putbox
5350 \cs_new_protected:Npn \xeCJK_ulem_skip_putbox:
5351   {
5352     \tl_if_empty:NF \UL@start
5353     { \box_use_drop:N \UL@box }
5354   }

```

`\xeCJK_ulem_initial`: The setting here is so that in the underline state, the underlines can automatically skip the full-corner punctuation and break lines before/after them correctly, and align with the beginning of the line and the end of the line.

```

5355 \cs_new_protected:Npn \xeCJK_ulem_initial:
5356   {
5357     \xeCJK_ulem_swap_cs:NN
5358     \xeCJK_FullLeft_and_Default: \xeCJK_ulem_FullLeft_and_Default:
5359     \xeCJK_FullLeft_and_CJK: \xeCJK_ulem_FullLeft_and_CJK:
5360     \xeCJK_FullLeft_and_Boundary: \xeCJK_ulem_FullLeft_and_Boundary:
5361     \xeCJK_FullRight_and_Default: \xeCJK_ulem_FullRight_and_Default:
5362     \xeCJK_FullRight_and_CJK: \xeCJK_ulem_FullRight_and_CJK:
5363     \xeCJK_FullRight_and_Boundary: \xeCJK_ulem_FullRight_and_Boundary:
5364     \xeCJK_CJK_and_CJK:N \xeCJK_ulem_CJK_and_CJK:N
5365     \xeCJK_CJK_and_Boundary:w \xeCJK_ulem_CJK_and_Boundary:w
5366     \xeCJK@fix@penalty \xeCJK_ulem_fix_penalty:
5367     \xeCJK_punct_breakable_kern:n \xeCJK_ulem_punct_breakable_kern:n
5368     \xeCJK_Default_and_FullLeft_glue:N \xeCJK_ulem_Default_and_FullLeft_glue:N
5369     \xeCJK_Default_and_FullRight_glue:N \xeCJK_ulem_Default_and_FullRight_glue:N
5370     \xeCJK_CJK_and_FullLeft_glue:N \xeCJK_ulem_CJK_and_FullLeft_glue:N
5371     \xeCJK_CJK_and_FullRight_glue:N \xeCJK_ulem_CJK_and_FullRight_glue:N
5372     \xeCJK_Boundary_and_FullLeft_glue:N \xeCJK_ulem_Boundary_and_FullLeft_glue:N
5373     \q_recursion_tail \q_nil \q_recursion_stop
5374     \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
5375     {
5376       \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
5377       {
5378         \str_if_eq:nnTF {##1} {####1}
5379         {
5380           \xeCJK_inter_class_toks:nnn { CJK } { CJK/##1 }
5381           { \xeCJK_ulem_between_CJK_blocks:nnN { CJK } {##1} }
5382           \xeCJK_inter_class_toks:nnn { CJK/##1 } { CJK/##1 }
5383           { \xeCJK_ulem_between_CJK_blocks:nnN { CJK } {##1} }
5384         }
5385       {
5386         \xeCJK_inter_class_toks:nnn { CJK/##1 } { CJK/####1 }
5387         { \xeCJK_ulem_between_CJK_blocks:nnN {##1} {####1} }
5388       }
5389     }
5390   }
5391 }
5392 \cs_new_protected:Npn \xeCJK_ulem_swap_cs:NN #1#2
5393   {
5394     \quark_if_recursion_tail_stop:N #1
5395     \xeCJK_swap_cs:NN #1#2
5396     \xeCJK_ulem_swap_cs:NN
5397   }

```

`\xeCJK_if_ulem_patch:TF` In the underline state, the `ulem` macro package uses the definition of `\UL@hrest` to recover `\UL`, etc. in the math mode or box, and there is no need to use `\UL@stop` and `\UL@start` to break the underline and generate a breakpoint at this time.

```

5398 \cs_new:Npn \xeCJK_if_ulem_patch:TF
5399   {
5400     \if_meaning:w \ \ LA@space
5401     \exp_after:wN \use_ii:nn
5402     \else:
5403     \exp_after:wN \use_i:nn
5404     \fi:
5405   }

```

```

\xecjk_ulem_CJK_and_Boundary:w 5406 \cs_new_protected:Npn \xeCJK_ulem_CJK_and_Boundary:w
5407   {
5408     \xeCJK_if_ulem_patch:TF
5409     {
5410       \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
5411       { \xeCJK_class_group_end: \CJKe glue }
5412       {
5413         \bool_if:NTF \l_xecjk_peek_ignore_spaces_bool
5414         { \xeCJK_ulem_peek_math:w }
5415         { \xeCJK_ulem_group_end:n { CJK } }
5416       }
5417     }
5418     { \xeCJK_ulem_CJK_and_Boundary:w }
5419   }
5420 \cs_new_protected:Npn \xeCJK_ulem_group_end:n #1
5421   {
5422     \xeCJK_class_group_end: \UL@stop
5423     \UL@start { \xeCJK_make_node:n { #1 } }
5424     \xeCJK_make_group_tag:
5425   }

```

`\xeCJK_ulem_peek_math:w` is used to handle the case where there is a space between the Chinese character and \$ in the underscore.¹⁷

```

5426 \cs_new_protected:Npn \xeCJK_ulem_peek_math:w
5427   {
5428     \cs_set_eq:NN \xeCJK_ulem_start:w \xeCJK_ulem_exp_stop:w
5429     \exp_after:wN \peek_after:Nw
5430     \exp_after:wN \xeCJK_ulem_peek_math_branches:w
5431     \exp:w \exp_end_continue_f:w
5432   }
5433 \cs_new_protected:Npn \xeCJK_ulem_peek_math_branches:w
5434   {
5435     \token_if_math_toggle:NTF \l_peek_token
5436     { \xeCJK_class_group_end: \CJKe glue }
5437     { \xeCJK_ulem_group_end:n { CJK-space } }
5438   }
5439 \cs_new_protected:Npn \xeCJK_ulem_exp_stop:w
5440   {
5441     \cs_if_eq:NNTF \UL@start \@empty
5442     { \exp_after:wN \exp_stop_f: }
5443     { \exp_after:wN \UL@start }
5444   }

```

```

\xecjk_ulem_fix_penalty: 5445 \cs_new_protected:Npn \xeCJK_ulem_fix_penalty:
5446   {
5447     \xeCJK_if_ulem_patch:TF
5448     { \fix@penalty }
5449     { \xeCJK_ulem_fix_penalty: }
5450   }

```

```

\xecjk_ulem_CJK_and_CJK:N 5451 \cs_new_protected:Npn \xeCJK_ulem_CJK_and_CJK:N
5452   {
5453     \xeCJK_if_ulem_patch:TF
5454     {

```

¹⁷ <https://github.com/CTeX-org/ctex-kit/issues/614>

```

5455     \xeCJK_class_group_end:
5456     \UL@stop \xeCJK_ulem_ccglue: \UL@start
5457     \xeCJK_ulem_class_group_begin:
5458     \xeCJK_select_font:
5459     \xeCJK_fallback_symbol:NN
5460     \CJKsymbol
5461   }
5462   { \xeCJK_ulem_CJK_and_CJK:N }
5463 }

```

```

\xxeCJK_ulem_class_group_begin: 5464 \cs_new_protected:Npn \xeCJK_ulem_class_group_begin:
5465   {
5466     \xeCJK_class_group_begin:
5467     \xeCJK_clear_Boundary_and_CJK_toks:
5468   }

```

```

\xxeCJK_ulem_between_CJK_blocks:nnN 5469 \cs_new_protected:Npn \xeCJK_ulem_between_CJK_blocks:nnN #1#2
5470   {
5471     \xeCJK_if_ulem_patch:TF
5472     {
5473       \xeCJK_class_group_end:
5474       \UL@stop \xeCJK_ulem_ccglue: \UL@start
5475       \xeCJK_class_group_begin:
5476       \xeCJK_clear_Boundary_and_CJK_toks:
5477       \xeCJK_switch_font:nn {#1} {#2}
5478       \xeCJK_fallback_symbol:NN
5479       \CJKsymbol
5480     }
5481     {
5482       \skip_horizontal:N \l_xeCJK_ccglue_skip
5483       \xeCJK_switch_font:nn {#1} {#2}
5484       \xeCJK_fallback_symbol:NN
5485       \CJKsymbol
5486     }
5487   }

```

```

\xxeCJK_ulem_Default_and_FullLeft_glue:N 5488 \cs_new_protected:Npn \xeCJK_ulem_Default_and_FullLeft_glue:N #1
5489   {
5490     \xeCJK_if_ulem_patch:TF
5491     {
5492       \UL@stop
5493       \xeCJK_ulem_skip_punct_begin:
5494       \xeCJK_punct_glue:NN \c_xeCJK_left_tl #1
5495       \UL@start
5496     }
5497     { \xeCJK_ulem_Default_and_FullLeft_glue:N #1 }
5498   }

```

```

\xxeCJK_ulem_Boundary_and_FullLeft_glue:N 5499 \cs_new_protected:Npn \xeCJK_ulem_Boundary_and_FullLeft_glue:N #1
5500   {
5501     \xeCJK_if_ulem_patch:TF
5502     {
5503       \UL@stop
5504       \xeCJK_ulem_skip_punct_begin:
5505       \xeCJK_punct_glue:NN \c_xeCJK_left_tl #1
5506       \UL@start
5507     }
5508     { \xeCJK_ulem_Boundary_and_FullLeft_glue:N #1 }
5509   }

```

```

\xxeCJK_ulem_CJK_and_FullLeft_glue:N 5510 \cs_new_protected:Npn \xeCJK_ulem_CJK_and_FullLeft_glue:N #1
5511   {
5512     \xeCJK_if_ulem_patch:TF
5513     {
5514       \xeCJK_class_group_end:
5515       \UL@stop
5516       \xeCJK_ulem_skip_punct_begin:
5517       \xeCJK_ulem_punct_ccglue:
5518       \xeCJK_punct_glue:NN \c_xeCJK_left_tl #1

```



```

5519     \UL@start
5520     \xeCJK_ulem_class_group_begin:
5521     \xeCJK_select_punct_font:
5522     }
5523     { \xeCJK_ulem_CJK_and_FullLeft_glue:N #1 }
5524   }

```

```

\xeCJK_ulem_Default_and_FullRight_glue:N 5525 \cs_new_protected:Npn \xeCJK_ulem_Default_and_FullRight_glue:N #1
5526   {
5527     \xeCJK_if_ulem_patch:TF
5528     {
5529       \UL@stop
5530       \xeCJK_ulem_skip_punct_begin:
5531       \xeCJK_punct_if_long:NTF #1
5532       { \xeCJK_allow_break: }
5533       { \xeCJK_no_break: }
5534       \xeCJK_punct_if_middle:NT #1
5535       {
5536         \xeCJK_punct_glue:NN \c xeCJK_right_tl #1
5537         \xeCJK_punct_rule:NN \c xeCJK_left_tl #1
5538       }
5539       \UL@start
5540     }
5541     { \xeCJK_ulem_Default_and_FullRight_glue:N #1 }
5542   }

```

```

\xeCJK_ulem_CJK_and_FullRight_glue:N 5543 \cs_new_protected:Npn \xeCJK_ulem_CJK_and_FullRight_glue:N #1
5544   {
5545     \xeCJK_if_ulem_patch:TF
5546     {
5547       \xeCJK_class_group_end:
5548       \UL@stop
5549       \xeCJK_ulem_skip_punct_begin:
5550       \xeCJK_punct_if_long:NTF #1
5551       { \xeCJK_allow_break: }
5552       { \xeCJK_no_break: }
5553       \xeCJK_punct_if_middle:NT #1
5554       {
5555         \xeCJK_ulem_punct_ccglue:
5556         \xeCJK_punct_glue:NN \c xeCJK_right_tl #1
5557         \xeCJK_punct_rule:NN \c xeCJK_left_tl #1
5558       }
5559       \UL@start
5560       \xeCJK_ulem_class_group_begin:
5561       \xeCJK_select_punct_font:
5562     }
5563     { \xeCJK_ulem_CJK_and_FullRight_glue:N #1 }
5564   }

```

```

\xeCJK_ulem_FullLeft_and_Default: 5565 \cs_new_protected:Npn \xeCJK_ulem_FullLeft_and_Default:
5566   {
5567     \xeCJK_if_ulem_patch:TF
5568     {
5569       \xeCJK_punct_if_middle:NTF \g xeCJK_last_punct_tl
5570       {
5571         \xeCJK_get_punct_bounds:No \c xeCJK_left_tl \g xeCJK_last_punct_tl 5572
5572         \xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl 5573
5573       }
5574       \xeCJK_class_group_end: \UL@stop \xeCJK_no_break:
5575       \xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
5576     }
5577     { \xeCJK_class_group_end: \UL@stop }
5578     \xeCJK_ulem_skip_punct_end:
5579     \xeCJK_no_break:
5580     \UL@start
5581   }
5582   { \xeCJK_ulem_FullLeft_and_Default: }

```

```

\XeCJK_ulem_FullLeft_and_Boundary: 5583 \cs_new_protected:Npn \XeCJK_ulem_FullLeft_and_Boundary:
5584 {
5585   \XeCJK_if_ulem_patch:TF
5586   {
5587     \XeCJK_punct_if_middle:NTF \gXeCJK_last_punct_tl
5588     {
5589       \XeCJK_get_punct_bounds:No \cXeCJK_left_tl \gXeCJK_last_punct_tl 5590
5590       \XeCJK_punct_rule:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl 5591
5591       \XeCJK_class_group_end: \UL@stop \XeCJK_no_break:
5592       \XeCJK_punct_glue:NN \cXeCJK_left_tl \gXeCJK_last_punct_tl
5593     }
5594     { \XeCJK_class_group_end: \UL@stop }
5595     \XeCJK_ulem_skip_punct_end:
5596     \XeCJK_no_break:
5597     \UL@start
5598     \tex_ignorespaces:D
5599   }
5600   { \XeCJK_ulem_FullLeft_and_Boundary: }
5601 }

```

```

\XeCJK_ulem_FullLeft_and_CJK: 5602 \cs_new_protected:Npn \XeCJK_ulem_FullLeft_and_CJK:
5603 {
5604   \XeCJK_if_ulem_patch:TF
5605   {
5606     \XeCJK_FullLeft_and_Default:
5607     \XeCJK_ulem_class_group_begin:
5608     \XeCJK_select_font:
5609   }
5610   { \XeCJK_ulem_FullLeft_and_CJK: }
5611 }

```

```

\XeCJK_ulem_FullRight_and_Default: 5612 \cs_new_protected:Npn \XeCJK_ulem_FullRight_and_Default:
5613 {
5614   \XeCJK_if_ulem_patch:TF
5615   {
5616     \XeCJK_punct_rule:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl
5617     \XeCJK_class_group_end:
5618     \UL@stop
5619     \XeCJK_punct_glue:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl
5620     \XeCJK_ulem_skip_punct_end:
5621     \UL@start
5622   }
5623   { \XeCJK_ulem_FullRight_and_Default: }
5624 }

```

```

\XeCJK_ulem_FullRight_and_Boundary: 5625 \cs_new_protected:Npn \XeCJK_ulem_FullRight_and_Boundary:
5626 {
5627   \XeCJK_if_ulem_patch:TF
5628   {
5629     \XeCJK_punct_rule:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl
5630     \XeCJK_class_group_end:
5631     \UL@stop
5632     \XeCJK_punct_glue:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl
5633     \XeCJK_ulem_skip_punct_end:
5634     \UL@start
5635     \tex_ignorespaces:D
5636   }
5637   { \XeCJK_ulem_FullRight_and_Boundary: }
5638 }

```

```

\XeCJK_ulem_FullRight_and_CJK: 5639 \cs_new_protected:Npn \XeCJK_ulem_FullRight_and_CJK:
5640 {
5641   \XeCJK_if_ulem_patch:TF
5642   {
5643     \XeCJK_punct_rule:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl
5644     \XeCJK_class_group_end:
5645     \UL@stop
5646     \XeCJK_punct_glue:NN \cXeCJK_right_tl \gXeCJK_last_punct_tl

```

```

5647     \xeCJK_ulem_punct_ccglue:
5648     \xeCJK_ulem_skip_punct_end:
5649     \UL@start
5650     \xeCJK_ulem_class_group_begin:
5651     \xeCJK_select_font:
5652     }
5653     { \xeCJK_ulem_FullRight_and_CJK: }
5654 }

```

```

\xxeCJK_ulem_punct_hskip:n 5655 \cs_new_protected:Npn \xeCJK_ulem_punct_hskip:n
5656 {
5657     \xeCJK_if_ulem_patch:TF
5658     { \xeCJK_ulem_hskip:n }
5659     { \xeCJK_ulem_punct_hskip:n }
5660 }

```

```

\xxeCJK_ulem_punct_breakable_kern:n 5661 \cs_new_protected:Npn \xeCJK_ulem_punct_breakable_kern:n #1
5662 {
5663     \xeCJK_if_ulem_patch:TF
5664     {
5665         \xeCJK_class_group_end:
5666         \UL@stop \xeCJK_ulem_hskip:n {#1} \UL@start
5667         \xeCJK_ulem_class_group_begin:
5668         \xeCJK_select_punct_font:
5669     }
5670     { \xeCJK_ulem_punct_breakable_kern:n {#1} }
5671 }

```

`\xeCJK_ulem_glue:n` in the underlined state instead of `\CJKglue` etc. respectively.

```

\xxeCJK_ulem_ccglue' 5672 \cs_new_protected:Npn \xeCJK_ulem_glue:n #1
\xxeCJK_ulem_punct_ccglue:
5673 {
5674     \xeCJK_if_ulem_patch:TF
5675     {
5676         \tl_if_empty:NTF \l_xeCJK_group_tag_tl
5677         { \UL@stop \xeCJK_ulem_hskip:n {#1} \UL@start }
5678         {
5679             \str_if_eq:eeTF { \l_xeCJK_group_tag_tl } { \c_xeCJK_group_tag_tl }
5680             { \UL@stop \xeCJK_ulem_hskip:n {#1} \UL@start }
5681             { \skip_horizontal:n {#1} }
5682         }
5683     }
5684     { \skip_horizontal:n {#1} }
5685 }
5686 \cs_new_protected:Npn \xeCJK_make_group_tag:
5687 { \tl_set:Nx \l_xeCJK_group_tag_tl { \c_xeCJK_group_tag_tl } }
5688 \tl_new:N \l_xeCJK_group_tag_tl
5689 \tl_const:Nn \c_xeCJK_group_tag_tl
5690 {
5691     T \ i n t _ u s e :N
5692     \tex_currentgroupstype:D 5692 L
5693     \ i n t _ u s e :N \tex_currentgrouplevel:D 5693 }
5694 \cs_new_protected:Npn \xeCJK_ulem_ccglue:
5695 { { { \skip_set_eq:NN \UL@skip \l_xeCJK_ccglue_skip \UL@leaders } } }
5696 \cs_new_protected:Npn \xeCJK_ulem_punct_ccglue:
5697 { \xeCJK_punct_hskip:n { \l_xeCJK_ccglue_skip } }

```

```

\xxeCJK_ulem_group_begin: 5698 \cs_new_protected:Npn \xeCJK_ulem_group_begin:
\xxeCJK_ulem_group_end: 5699 {
    \xeCJK_ulem_on:n 5700     \mode_leave_vertical:
5701     \c_group_begin_token
5702 }
5703 \cs_new_protected:Npn \xeCJK_ulem_group_end:
5704 { \c_group_end_token }
5705 \cs_new_protected:Npn \xeCJK_ulem_on:n
5706 { \ULon }
5707 \cs_new_eq:NN \xeCJK_ulem_on:n \UL@on
5708 \cs_set_protected:Npn \UL@on #1
5709 { \xeCJK_ulem_on:n { \xeCJK_ulem_left: #1 \xeCJK_ulem_right: } }

```

Parameters of `\xeCJKfntefon` extension `\ULon`.

```

5710 \NewDocumentCommand \xeCJKfntefon { s t- s o }
5711 {
5712   \mode_leave_vertical:
5713   \xeCJK_ulem_boot:nnnn #1#2#3 {#4}
5714   \xeCJK_ulem_on:n
5715 }

```

```

\CJKunderline5716 \NewDocumentCommand \CJKunderline { s t- s o }
5717 {
5718   \xeCJK_ulem_group_begin:
5719   \xeCJK_fntef_boot:nnnnn { underline } { uline } #1#2#3 {#4}
5720   \xeCJK_fntef_initial:nnn
5721   { \l xeCJK_uline_depth_tl }
5722   { \l xeCJK_uline_sep_tl }
5723   {
5724     \l xeCJK_uline_format_tl
5725     \tex_vrule:D
5726     height \dim_eval:n { \l xeCJK_uline_thickness_tl }
5727     depth \c_zero_dim
5728     width .2em
5729   }
5730   \xeCJK_ulem_on:n
5731 }
5732 \NewDocumentCommand \varCJKunderline {}
5733 { \CJKunderline - }

```

```

\CJKunderwave5734 \NewDocumentCommand \CJKunderwave { s t- s o }
5735 {
5736   \xeCJK_ulem_group_begin:
5737   \xeCJK_fntef_boot:nnnnn { underwave } { uwave } #1#2#3 {#4}
5738   \xeCJK_fntef_initial:nnn
5739   { \l xeCJK_uwave_depth_tl }
5740   { \l xeCJK_uwave_sep_tl }
5741   { \l xeCJK_uwave_format_tl \l xeCJK_uwave_symbol_tl }
5742   \xeCJK_ulem_on:n
5743 }

```

```

\CJKunderdblline5744 \NewDocumentCommand \CJKunderdblline { s t- s o }
5745 {
5746   \xeCJK_ulem_group_begin:
5747   \xeCJK_fntef_boot:nnnnn { underdblline } { udblline } #1#2#3 {#4}
5748   \xeCJK_fntef_initial:nnn
5749   { \l xeCJK_udblline_depth_tl }
5750   { \l xeCJK_udblline_sep_tl }
5751   {
5752     \l xeCJK_udblline_format_tl
5753     \vbox_top:n
5754     {
5755       \tex_hrulerule:D
5756       height \dim_eval:n { \l xeCJK_udblline_thickness_tl }
5757       depth \c_zero_dim
5758       width .2em
5759       \tex_kern:D \dim_eval:n { \l xeCJK_udblline_gap_tl }
5760       \tex_hrulerule:D
5761       height \dim_eval:n { \l xeCJK_udblline_thickness_tl }
5762       depth \c_zero_dim
5763       width .2em
5764     }
5765   }
5766   \xeCJK_ulem_on:n
5767 }

```

```

\CJKsout5768 \NewDocumentCommand \CJKsout { s t- s o }
5769 {
5770   \xeCJK_ulem_group_begin:
5771   \xeCJK_fntef_boot:nnnnn { sout } { sout } #1#2#3 {#4}
5772   \xeCJK_fntef_initial:nn

```

```

5773     {
5774     \l xeCJK_sout_format_tl
5775     \tex_vrule:D
5776         height \dim_eval:n { \l xeCJK_sout_thickness_tl }
5777         depth \c_zero_dim
5778         width .2em
5779     }
5780     {
5781     \box_move_up:nn
5782     { \l xeCJK_sout_height_tl - \box_ht:N \l xeCJK_fntef_box / 2 }
5783     { \box_use:N \l xeCJK_fntef_box }
5784     }
5785     \xeCJK_ulem_on:n
5786 }

\CJKxout 5787 \NewDocumentCommand \CJKxout { s t- s o }
5788 {
5789     \xeCJK_ulem_group_begin:
5790     \xeCJK_fntef_boot:nnNNNn { xout } { xout } #1#2#3 {#4}
5791     \xeCJK_fntef_initial:nn
5792     {
5793     \l xeCJK_xout_format_tl
5794     \tex_kern:D -.1 em $/$
5795     \tex_kern:D -.1 em
5796     }
5797     {
5798     \box_move_up:nn
5799     { \box_dp:N \l xeCJK_fntef_box / 2 }
5800     { \box_use:N \l xeCJK_fntef_box }
5801     }
5802     \xeCJK_ulem_on:n
5803 }

\CJKunderanyline 5804 \NewDocumentCommand \CJKunderanyline { s t- s o m m }
5805 {
5806     \xeCJK_ulem_group_begin:
5807     \xeCJK_ulem_boot:NNNn #1#2#3 {#4}
5808     \xeCJK_fntef_initial:nn
5809     {#6}
5810     {
5811     \box_move_down:nn
5812     {#5}
5813     { \box_use:N \l xeCJK_fntef_box }
5814     }
5815     \tl_if_empty:NF \l xeCJK_ulem_boxdepth_tl
5816     { \box_set_dp:Nn \ULC@box { \l xeCJK_ulem_boxdepth_tl } }
5817     \tl_if_empty:NF \l xeCJK_ulem_sep_tl
5818     {
5819     \bool_set_true:N \l xeCJK_fntef_bool
5820     \dim_set:Nn \l xeCJK_fntef_dim
5821     { \l xeCJK_ulem_sep_tl + \box_dp:N \ULC@box }
5822     }
5823     \xeCJK_ulem_on:n
5824 }

```

`\xeCJK_fntef_boot:nnNNNn` Handle the parameter problem.

```

5825 \cs_new_protected:Npn \xeCJK_fntef_boot:nnNNNn #1#2#3#4#5#6
5826 {
5827     \bool_lazy_or:nnT {#3} {#5}
5828     { \bool_set_false:c { l xeCJK_#2_skip_bool }
5829     \bool_if:NT #4
5830     { \bool_set_true:c { l xeCJK_#2_subtract_bool }
5831     \tl_if_novalue:nF {#6}
5832     { \keys_set:nn { xeCJK / options / #1 } {#6} }
5833     \bool_set_eq:Nc \l xeCJK_ulem_skip_bool { l xeCJK_#2_skip_bool }
5834     \bool_set_eq:Nc \l xeCJK_ulem_hidden_bool { l xeCJK_#2_hidden_bool }
5835     \bool_set_eq:Nc \l xeCJK_ulem_subtract_bool { l xeCJK_#2_subtract_bool }

```

```

5836 \tl_set_eq:Nc \l xeCJK_ulem_text_format_tl { \l xeCJK_#2_text_format_tl }
5837 }
5838 \cs_new_protected:Npn \xeCJK_ulem_boot:NNNn #1#2#3#4
5839 {
5840 \bool_lazy_or:nnT {#1} {#3}
5841 { \bool_set_false:N \l xeCJK_ulem_skip_bool }
5842 \bool_if:NT #2
5843 { \bool_set_true:N \l xeCJK_ulem_subtract_bool }
5844 \tl_if_novalue:nF {#4}
5845 { \keys_set:nn { xeCJK / options / ulem } {#4} }
5846 }

```

`\xeCJK_fntef_initial:n` does not support the nested use of underscore. When underscore is used in nesting, the inner underscore will be put in the box and cannot be folded.

```

5847 \cs_new_protected:Npn \xeCJK_fntef_initial:n
5848 {
5849 \bool_if:NTF \l xeCJK_nest_bool
5850 { \xeCJK_warning:n { fntef-nesting } }
5851 {
5852 \bool_set_true:N \l xeCJK_nest_bool
5853 \xeCJK_restore_shipout_fntef:
5854 }
5855 \xeCJK_fntef_sbox:n
5856 }
5857 \cs_new_protected:Npn \xeCJK_fntef_initial:nn #1
5858 {
5859 \xeCJK_fntef_initial:n {#1}
5860 \bool_if:NF \l xeCJK_fntef_bool
5861 { \dim_zero:N \l xeCJK_fntef_dim }
5862 \markoverwith
5863 }
5864 \cs_new_protected:Npn \xeCJK_fntef_initial:nnn #1#2#3
5865 {
5866 \xeCJK_fntef_initial:n {#3}
5867 \bool_if:NF \l xeCJK_fntef_bool
5868 {
5869 \bool_set_true:N \l xeCJK_fntef_bool
5870 \dim_set:Nn \l xeCJK_fntef_dim {#1}
5871 }
5872 \markoverwith
5873 {
5874 \box_move_down:nn
5875 { \l xeCJK_fntef_dim + \box_ht:N \l xeCJK_fntef_box }
5876 { \box_use:N \l xeCJK_fntef_box }
5877 }
5878 \dim_set:Nn \l xeCJK_fntef_dim { #2 + \box_dp:N \ULC@box }
5879 }
5880 \box_new:N \l xeCJK_fntef_box
5881 \cs_new_eq:NN \xeCJKfntefbox \l xeCJK_fntef_box
5882 \bool_new:N \l xeCJK_nest_bool
5883 \bool_new:N \l xeCJK_fntef_bool
5884 \xeCJK_msg_new:nn { fntef-nesting }
5885 { Nesting~is~not~supported. }

```

`\l xeCJK_fntef_dim` records the depth of underscore or underscore symbol so that the distance can be adjusted automatically when they are used in nesting. `\ULdepth` is initialized by `ulem` to `\maxdimen`. `ulem` has to use it for calculation when underscore is nested, and it may overflow. For the sake of simplicity, `\l xeCJK_fntef_dim` and `\ULdepth` share one register.

```
5886 \cs_new_eq:NN \l xeCJK_fntef_dim \ULdepth
```

`\xeCJK_fntef_sbox:n` is similar to `\hcoffin_set:Nn` and LATEX 2 ϵ 's `\sbox` function. make sure the color is correct. While `coffin` makes it easier to manipulate the box, it is a bit slower. And, as our needs are simpler, we don't use it.

```

5887 \cs_new_protected:Npn \xeCJK_fntef_sbox:n #1
5888 {

```

Section 5 *xeCJK*
5889 \hbox_set:Nn \l_xeCJK_fntef_box
5890 { \color_ensure_current: #1 }
5891 }

The most suitable one is to use `xtemplate` macro package to implement it, but it is more difficult to use `\xeCJKsetup` to set it uniformly, so we will use the native method here.

```

5892 \keys_define:nn { xeCJK / options }
5893 {
5894   underdot / symbol      .tl_set:N = \l xeCJK_udot_symbol_tl ,
5895   underdot / depth      .tl_set:N = \l xeCJK_udot_depth_tl ,
5896   underdot / sep        .tl_set:N = \l xeCJK_udot_sep_tl ,
5897   underdot / format     .tl_set:N == \l xeCJK_udot_format_tl ,
                               sy
                               nc
                               ,
                               co
                               rr
                               ec
                               te
                               d
                               by
                               el
                               de
                               r
                               m
                               an
                               ==
5898   underdot / textformat .tl_set:N = \l xeCJK_udot_text_format_tl ,
5899   underdot / boxdepth  .tl_set:N = \l xeCJK_udot_boxdepth_tl ,
5900   symbol / sep         .tl_set:N = \l xeCJK_symbol_sep_tl ,
5901   symbol / boxdepth   .tl_set:N = \l xeCJK_symbol_boxdepth_tl ,
5902   symbol / textformat .tl_set:N = \l xeCJK_symbol_text_format_tl ,
5903   underline / skip    .bool_set:N = \l xeCJK_uline_skip_bool ,
5904   underline / hidden  .bool_set:N = \l xeCJK_uline_hidden_bool ,
5905   underline / subtract .bool_set:N = \l xeCJK_uline_subtract_bool ,
5906   underline / thickness .tl_set:N = \l xeCJK_uline_thickness_tl ,
5907   underline / depth   .tl_set:N = \l xeCJK_uline_depth_tl ,
5908   underline / sep     .tl_set:N = \l xeCJK_uline_sep_tl ,
5909   underline / format  .tl_set:N = \l xeCJK_uline_format_tl ,
5910   underline / textformat .tl_set:N = \l xeCJK_uline_text_format_tl ,
5911   underdblline / skip .bool_set:N = \l xeCJK_udbline_skip_bool ,
5912   underdblline / hidden .bool_set:N = \l xeCJK_udbline_hidden_bool ,
5913   underdblline / subtract .bool_set:N = \l xeCJK_udbline_subtract_bool , 5914
   underdblline / thickness .tl_set:N = \l xeCJK_udbline_thickness_tl ,
5915   underdblline / depth .tl_set:N = \l xeCJK_udbline_depth_tl ,
5916   underdblline / sep   .tl_set:N = \l xeCJK_udbline_sep_tl ,
5917   underdblline / format .tl_set:N = \l xeCJK_udbline_format_tl ,
5918   underdblline / textformat .tl_set:N = \l xeCJK_udbline_text_format_tl ,
5919   underdblline / gap   .tl_set:N = \l xeCJK_udbline_gap_tl , 5920
   underwave / skip    .bool_set:N = \l xeCJK_uwave_skip_bool , 5921
   underwave / hidden  .bool_set:N = \l xeCJK_uwave_hidden_bool ,
5922   underwave / subtract .bool_set:N = \l xeCJK_uwave_subtract_bool ,
5923   underwave / symbol  .tl_set:N = \l xeCJK_uwave_symbol_tl ,
5924   underwave / depth   .tl_set:N = \l xeCJK_uwave_depth_tl ,
5925   underwave / sep     .tl_set:N = \l xeCJK_uwave_sep_tl , 5926
   underwave / format  .tl_set:N = \l xeCJK_uwave_format_tl ,
5927   underwave / textformat .tl_set:N = \l xeCJK_uwave_text_format_tl ,
5928   sout / skip        .bool_set:N = \l xeCJK_sout_skip_bool ,
5929   sout / hidden     .bool_set:N = \l xeCJK_sout_hidden_bool , 5930
   sout / subtract   .bool_set:N = \l xeCJK_sout_subtract_bool ,
5931   sout / thickness  .tl_set:N = \l xeCJK_sout_thickness_tl , 5932
   sout / height     .tl_set:N = \l xeCJK_sout_height_tl ,
5933   sout / format    .tl_set:N = \l xeCJK_sout_format_tl ,
5934   sout / textformat .tl_set:N = \l xeCJK_sout_text_format_tl ,
5935   xout / skip      .bool_set:N = \l xeCJK_xout_skip_bool ,
5936   xout / hidden   .bool_set:N = \l xeCJK_xout_hidden_bool , 5937
   xout / subtract  .bool_set:N = \l xeCJK_xout_subtract_bool ,
5938   xout / format   .tl_set:N = \l xeCJK_xout_format_tl ,
5939   xout / textformat .tl_set:N = \l xeCJK_xout_text_format_tl ,
5940   ulem / skip     .bool_set:N = \l xeCJK_ulem_skip_bool ,
5941   ulem / hidden  .bool_set:N = \l xeCJK_ulem_hidden_bool , 5942
   ulem / subtract .bool_set:N = \l xeCJK_ulem_subtract_bool ,
5943   ulem / sep     .tl_set:N = \l xeCJK_ulem_sep_tl ,
5944   ulem / boxdepth .tl_set:N = \l xeCJK_ulem_boxdepth_tl ,

```



```
5945   ulem / textformat          .tl_set:N = \l_xeCJK_ulem_text_format_tl
5946   }
5947 \clist_map_inline:nn
5948   { underdot , underline , underdblline , underwave , sout , xout , ulem }
5949   {
5950     \keys_define:nn { xeCJK / options }
5951       { #1 .meta:nn = { xeCJK / options / #1 } { ##1 }
5952     }
5953 \keys_set:nn { xeCJK / options }
5954   {
5955     underdot / symbol          = \normalfont . ,
```

```

5956   underdot / depth           = 0.20 em ,
5957   underdot / sep             = 0.04 em ,
5958   symbol / sep               = \c_zero_dim ,
5959   underline / skip           = true ,
5960   underline / thickness      = \ULthickness ,
5961   underline / depth          = 0.20 em ,
5962   underline / sep            = 0.07 em ,
5963   underdblline / skip        = true ,
                                     =
                                     s
                                     y
                                     n
                                     c,
                                     c
                                     o
                                     rr
                                     e
                                     ct
                                     e
                                     d
                                     b
                                     y
                                     el
                                     d
                                     e
                                     r
                                     m
                                     a
                                     n
                                     =
                                     =
5964   underdblline / thickness    = \ULthickness ,
5965   underdblline / depth        = 0.20 em ,
5966   underdblline / sep          = 0.17 em ,
5967   underdblline / gap          = 1.1 pt ,
5968   underwave / skip            = true ,
5969   underwave / symbol          = \sixly \tex_char:D 58 \exp_stop_f: ,
5970   underwave / depth           = 0.20 em ,
5971   underwave / sep             = 0.00 em ,
5972   sout / skip                  = true ,
5973   sout / thickness            = \ULthickness ,
5974   sout / height               = 0.35 em ,
5975   xout / skip                  = true
5976 }

```

```

\CJKunderansymbol5977 \NewDocumentCommand \CJKunderansymbol { o m m m }
5978 {
5979   \xeCJK_under_symbol:nnnnnnn { symbol } { symbol } {#1} {#2} {#3} {#4}
5980   \tex_ignorespaces:D
5981 }

```

\CJKunderdot \CJKunderdot is a special case of \CJKunderansymbol. CJKfntef originally used the mathematical symbol \cdot, here it is changed to the more appropriate .

```

5982 \NewDocumentCommand \CJKunderdot { o m }
5983 {
5984   \xeCJK_under_symbol:nnnnnnn { underdot } { udot }
5985   {#1}
5986   { \l xeCJK_udot_depth_tl }
5987   { \l xeCJK_udot_format_tl \l xeCJK_udot_symbol_tl }
5988   {#2}
5989   \tex_ignorespaces:D
5990 }

```

\xeCJK_under_symbol:nnnnnnn When in the underline, we break the underline first and set the underline symbol outside the group.

```

5991 \cs_new_protected:Npn \xeCJK_under_symbol:nnnnnnn
5992 {
5993   \xeCJK_if_ulem_patch:TF
5994     { \xeCJK_under_symbol_auxi:nnnnnnn }
5995     { \xeCJK_under_symbol_auxii:nnnnnnn }
5996 }

```

```
5997 \cs_new_protected:Npn \xeCJK_under_symbol_auxi:nnnnnnn #1#2#3#4#5#6
5998 {
5999   \xeCJK_ulem_right: \UL@stop
6000   \group_begin:
6001     \xeCJK_under_symbol_initial:nnnnnn {#1} {#2} {#3} {#4} {#5}
6002     \use:c { l xeCJK_#2_text_format_tl }
6003     \UL@start \xeCJK_ulem_right_node:
6004       #6
6005     \xeCJK_ulem_right: \UL@stop
6006   \group_end:
6007   \UL@start \xeCJK_ulem_right_node:
6008 }
6009 \cs_new_protected:Npn \xeCJK_under_symbol_auxii:nnnnnnn #1#2#3#4#5#6
6010 {
6011   \mode_leave_vertical:
6012   \group_begin:
6013     \xeCJK_under_symbol_initial:nnnnnn {#1} {#2} {#3} {#4} {#5}
6014     \xeCJK_under_symbol_text_format:c { l xeCJK_#2_text_format_tl }
```

```

6015     #6
6016     \xeCJK_ulem_right:
6017     \group_end:
6018     \xeCJK_ulem_right_node:
6019   }
6020 \cs_new_protected:Npn \xeCJK_under_symbol_initial:nnnnn #1#2#3#4#5
6021   {
6022     \tl_if_novalue:nF {#3}
6023     { \keys_set:nn { xeCJK / options / #1 } {#3} }
6024     \xeCJK_fntef_sbox:n {#5}
6025     \bool_if:NTF \l xeCJK_fntef_bool
6026     { \xeCJK_make_under_symbol:n { \l xeCJK_fntef_dim } }
6027     {
6028       \bool_set_true:N \l xeCJK_fntef_bool
6029       \xeCJK_make_under_symbol:n {#4}
6030     }
6031     \tl_if_empty:cF { l xeCJK_#2_boxdepth_tl }
6032     {
6033       \box_set_dp:Nn \l xeCJK_under_symbol_box
6034       { \use:c { l xeCJK_#2_boxdepth_tl } } 6035
6035     }
6036     \dim_set:Nn \l xeCJK_fntef_dim
6037     { \use:c { l xeCJK_#2_sep_tl } + \box_dp:N \l xeCJK_under_symbol_box }
6038     \xeCJK_swap_cs:NN \CJKsymbol \xeCJK_under_CJKsymbol:N
6039     \xeCJK_restore_shipout_CJKsymbol:
6040   }
6041 \cs_new_protected:Npn \xeCJK_under_symbol_text_format:N #1
6042   {
6043     \tl_if_empty:NF #1
6044     { \xeCJK_ulem_right: #1 \xeCJK_ulem_right_node: }
6045   }
6046 \cs_generate_variant:Nn \xeCJK_under_symbol_text_format:N { c }
6047 \box_new:N \l xeCJK_under_symbol_box

```

`\xeCJK_make_under_symbol:n` We measure the width of “one” as the width of the Chinese character.

```

6048 \cs_new_protected:Npn \xeCJK_make_under_symbol:n #1
6049   {
6050     \hbox_set:Nn \l xeCJK_under_symbol_box
6051     {
6052       \box_move_down:nn { #1 + \box_ht:N \l xeCJK_fntef_box }
6053       {
6054         \hbox_to_zero:n
6055         {
6056           \xeCJK_select_font:
6057           \tex_kern:D \tex_fontcharwd:D \tex_font:D "4E00 \exp_stop_f:
6058           \tex_hss:D \box_use:N \l xeCJK_fntef_box \tex_hss:D
6059         }
6060       }
6061     }
6062   }

```

`_xeCJK_restore_shipout_CJKsymbol:` `\CJKKunderdot` changes to `\CJKsymbol` will affect the header and footer, so you need to handle it carefully.

```

6063 \cs_new_protected:Npn \xeCJK_restore_shipout_CJKsymbol:
6064   {
6065     \tl_put_right:Nn \l xeCJK_fntef_shipout_tl
6066     { \xeCJK_swap_cs:NN \CJKsymbol \xeCJK_under_CJKsymbol:N }
6067     \xeCJK_restore_shipout_fntef:
6068     \xeCJK_cs_clear:N \xeCJK_restore_shipout_CJKsymbol:
6069   }
6070 \cs_new_protected:Npn \xeCJK_restore_shipout_fntef:
6071   {
6072     \tl_put_right:Nn \l xeCJK_fntef_shipout_tl
6073     {
6074       \bool_set_false:N \l xeCJK_fntef_bool
6075       \dim_zero:N \l xeCJK_fntef_dim
6076     }

```

```

6077 \xeCJK_cs_clear:N \xeCJK_restore_shipout_fntef:
6078 }
6079 \tl_new:N \l_xeCJK_fntef_shipout_tl
6080 \xeCJK_add_to_shipout:n { \l_xeCJK_fntef_shipout_tl }

```

`\xeCJK_under_TheCJKsymbol:N` box is placed on the left side of the Chinese character, which is easier to handle the state transfer problem.

```

6081 \cs_new_protected:Npn \xeCJK_under_CJKsymbol:N
6082 {
6083 \box_use:N \l_xeCJK_under_symbol_box
6084 \xeCJK_no_break: \xeCJK_under_CJKsymbol:N
6085 }

```

`CJKfilltwosides` uses `minipage` and LATEX table (`tabular`) to define the `CJKfilltwosides` environment. The optional parameter `#1` indicates the vertical alignment position of the environment and is centered by default; parameter `#2` indicates the width of the environment. For environments with asterisks, if `#2` is not greater than zero or not greater than the width of the longest text line of the environment, the natural width of the environment is taken.

```

6086 \NewDocumentEnvironment { CJKfilltwosides } { 0 { c } m }
6087 {
6088 \use:e { \exp_not:N \minipage [#1] { \dim_eval:n {#2} } }
6089 \cs_set_eq:NN \CJKglue \xeCJK_fntef_hfilll:
6090 }
6091 {
6092 \endminipage
6093 \ignorespacesafterend
6094 }
6095 \NewDocumentEnvironment { CJKfilltwosides* } { 0 { c } m +b }
6096 {
6097 \mode_leave_vertical:
6098 \cs_set_eq:NN \CJKglue \xeCJK_fntef_hfilll:
6099 \tl_set:Nn \arraystretch { 1 }
6100 \cs_if_free:NF \extrarowheight
6101 { \cs_set_eq:NN \extrarowheight \c_zero_dim }
6102 \use:e { \xeCJK_fill_two_sides:nnn {#1} { \dim_eval:n {#2} } } {#3}
6103 }
6104 { \ignorespacesafterend }
6105 \cs_new_protected:Npn \xeCJK_fill_two_sides:nnn #1#2#3
6106 {
6107 \dim_compare:nNnTF {#2} > \c_zero_dim
6108 {
6109 \hbox_set:Nn \l_xeCJK_tmp_box
6110 { \tabular [#1] { @ { } c @ { } #3 \endtabular }
6111 \dim_compare:nNnTF {#2} > { \box_wd:N \l_xeCJK_tmp_box }
6112 { \tabular [#1] { @ { } p {#2} @ { } } #3 \endtabular } #3 \endtabular } #3 \endtabular }
6113 { \box_use:N \l_xeCJK_tmp_box }
6114 }
6115 { \tabular [#1] { @ { } c @ { } #3 \endtabular }
6116 }

```

`\xeCJK_fntef_hfilll:colortbl` changed the `\hfil` used for fill in column `c` of the table to a higher-order `fill`, which affects `CJKfilltwosides*`. Therefore we have to use the higher-order `filll` as well.

```

6117 \cs_new_protected:Npn \xeCJK_fntef_hfilll:
6118 { \skip_horizontal:N \c_xeCJK_filll_skip }
6119 \skip_const:Nn \c_xeCJK_filll_skip { \c_zero_dim plus 1 filll }
6120 </fntef>

```

5.20 *xeCJK*-listings

Supports the `listings` macro package, following the handling of `lftjp-listings` in the `luatexja` macro package.

```
6121 <*listings>
```

```
6122 \DeclareOption* { \PassOptionsToPackage { \CurrentOption } { xecjk } }  
6123 \ProcessOptions \scan_stop:
```

```

6124 \RequirePackage { xecjk }
6125 \RequirePackage { listings }

6126 \lst@AddToHook { Init } { \ xecjk_listings_initial_hook: }
6127 \lst@AddToHook { SelectCharTable } { \ xecjk_listings_toks_hook: }
6128 \lst@AddToHook { OutputBox }
6129   {
6130     \tl_set_eq:NN \l_xecjk_punct_style_tl \c_xecjk_punct_style_plain_tl
6131     \l_xecjk_restore_listings_toks_tl
6132     \ xecjk_listings_output_CM:
6133   }
6134 \lst@AddToHook { PreSet } { \bool_set_true:N \l_xecjk_listings_env_bool }

```

`_xecjk_listings_initial_hook:` `\XeTeXinterchartoks` need to be restored in `\lst@numberstyle` in order to make the code line number result correct. When changing pages in the `listings` environment, **the** changes to `\XeTeXinterchartoks` will affect the header and footer. **The** `\shipout` box needs to be restored to its normal definition. `\tex_noindent:D` is added to enter horizontal mode to prevent extra blank lines when Chinese characters appear in the first line. `\lst@prebreak` and `\lst@postbreak` are added to the

The direct output in `\Discretionary` should restore normal `\XeTeXinterchartoks`.

```

6135 \cs_new_protected:Npn \ xecjk_listings_initial_hook:
6136   {
6137     \tex_noindent:D
6138     \bool_gset_false:N \g_xecjk_listings_CM_bool
6139     \tl_put_left:Nn \lst@numberstyle { \l_xecjk_restore_listings_toks_tl }
6140     \xecjk_add_to_shipout:n { \l_xecjk_restore_listings_toks_tl }
6141     \lst@ifbreaklines
6142       \cs_set_eq:NN \ xecjk_listings_CJK_toks_hook: \ xecjk_listings_breaklines_toks:
6143       \tl_if_empty:NF \lst@prebreak
6144         { \tl_put_left:Nn \lst@prebreak { \l_xecjk_restore_listings_toks_tl } }
6145       \tl_if_empty:NF \lst@postbreak
6146         { \tl_put_left:Nn \lst@postbreak { \l_xecjk_restore_listings_toks_tl } }
6147     \fi:
6148     \int_set:Nn \l_xecjk_listings_max_char_int
6149       { \lst@ifec 255 \else: 127 \fi: }
6150   }
6151 \int_new:N \l_xecjk_listings_max_char_int

```

`_xecjk_listings_toks_hook:` Adopt a different `\XeTeXinterchartoks` processing method, when inputting, the Chinese characters are added to the output queue of `listings`, and the actual output is ordinary text.

```

6152 \cs_new_protected:Npn \ xecjk_listings_toks_hook:
6153   {
6154     \tl_clear:N \l_xecjk_restore_listings_toks_tl
6155     \seq_map_function:NN
6156       \g_xecjk_class_seq \ xecjk_backup_inter_class_toks:n
6157     \seq_map_inline:Nn \g_xecjk_non_CJK_class_seq
6158       {
6159         \str_if_eq:nnF { ##1 } { Boundary }
6160         {
6161           \ xecjk_inter_class_toks:nnn { Boundary } { ##1 }
6162           { \ xecjk_listings_process_Default:nN { ##1 } } 6163
6163         }
6164       }
6165     \xecjk_inter_class_toks:nnn { Boundary } { CM }
6166     { \ xecjk_listings_process_CM:nN { 0 } }
6167     \ xecjk_listings_CJK_toks_hook:
6168   }

```

`_xecjk_backup_inter_class_toks:n` Note that assigning null values to `\XeTeXinterchartoks` will cause X_ET_EX to crash!

```

6169 \cs_new_protected:Npn \ xecjk_backup_inter_class_toks:n #1
6170   {
6171     \tl_set:Nx \l_xecjk_tmp_tl

```

```
6172 { \xeCJK_get_inter_class_toks:nn { Boundary } {#1} }
6173 \tl_put_right:Nx \l_xeCJK_restore_listings_toks_tl
6174 {
6175   \xeCJK_inter_class_toks:nnn { Boundary } {#1}
```



```

6176     {
6177         \tl_if_empty:NTF \l_xeCJK_tmp_tl
6178             { \exp_not:N \prg_do_nothing: }
6179             { \exp_not:o \l_xeCJK_tmp_tl }
6180     }
6181 }
6182 }
6183 \tl_new:N \l_xeCJK_restore_listings_toks_tl

```

`_xeCJK_listings_CJK_toks_hook`: choose different handling methods according to whether the `breaklines` option is used or not.

```

\_xeCJK_listings_breaklines_toks:
6184 \cs_new_protected:Npn \_xeCJK_listings_CJK_toks_hook:
6185 {
6186     \xeCJK_inter_class_toks:nnn { Boundary } { CJK }
6187     { \_xeCJK_listings_process_CJK:nN { 2 } }
6188     \xeCJK_inter_class_toks:nnn { Boundary } { FullLeft }
6189     { \_xeCJK_listings_process_CJK:nN { 2 } }
6190     \xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
6191     { \_xeCJK_listings_process_CJK:nN { 2 } }
6192     \xeCJK_inter_class_toks:nnn { Boundary } { HangulJamo }
6193     { \_xeCJK_listings_process_CJK:nN { 2 } }
6194     \seq_map_inline:Nn \g_xeCJK_CJK_sub_class_seq
6195     {
6196         \xeCJK_inter_class_toks:nnn { Boundary } { CJK/##1 }
6197         { \_xeCJK_listings_process_CJK:nN { 2 } }
6198     }
6199 }
6200 \cs_new_protected:Npn \_xeCJK_listings_breaklines_toks:
6201 {
6202     \xeCJK_inter_class_toks:nnn { Boundary } { CJK }
6203     { \_xeCJK_listings_process_breaklines_CJK:nN { 2 } } 6204
6204     \xeCJK_inter_class_toks:nnn { Boundary } { HangulJamo }
6205     { \_xeCJK_listings_process_breaklines_CJK:nN { 2 } } 6206
6206     \xeCJK_inter_class_toks:nnn { Boundary } { FullLeft } 6207
6207     { \_xeCJK_listings_process_FullLeft:nN { 2 } }
6208     \xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
6209     { \_xeCJK_listings_process_FullRight:nN { 2 } }
6210     \seq_map_inline:Nn \g_xeCJK_CJK_sub_class_seq
6211     {
6212         \xeCJK_inter_class_toks:nnn { Boundary } { CJK/##1 } 6213
6213         { \_xeCJK_listings_process_breaklines_CJK:nN { 2 } } 6214
6214     }
6215 }

```

`_xeCJK_listings_process_Default:nN` For characters whose `\charcode` is greater than 255, process them according to `\catcode`.

```

6216 \cs_new_protected:Npn \_xeCJK_listings_process_Default:nN #1#2
6217 {
6218     \int_compare:nNnTF
6219     { \_xeCJK_token_value_charcode:N #2 } > \l_xeCJK_listings_max_char_int
6220     {
6221         \token_if_letter:NTF #2
6222         { \lst@ProcessLetter #2 }
6223         { \lst@ProcessOther #2 }
6224     }
6225     { \_xeCJK_listings_output_Default:nN {#1} #2 }
6226 }

```

When outputting, be careful to clear out the corresponding `\XeTeXinterchartoks`, otherwise it will cause a dead loop. `\scan_stop:` is the boundary creation, output `\group_end:`.

```

6227 \cs_new_protected:Npn \_xeCJK_listings_output_Default:nN #1#2
6228 {
6229     \group_begin:
6230     \xeCJK_clear_inter_class_toks:nn { Boundary } {#1}
6231     \xeCJK_inter_class_toks:nnn {#1} { Boundary } { \group_end: }
6232     #2
6233     \scan_stop:
6234 }

```

`_xeCJK_listings_process_CJK:nN` Processing of CJK character classes.

```
6235 \cs_new_protected:Npn \xeCJK_listings_process_CJK:nN #1#2
6236 {
6237   \token_if_letter:NTF #2
6238   { \xeCJK_listings_process_letter:nN {#1} #2 }
6239   { \xeCJK_listings_process_other:nN {#1} #2 }
6240 }
```

`\xeCJK_listings_append:nN` The width of normal CJK characters is twice the normal basic width, and CM classes do not increase the width. There is a problem here that some half-corner characters in CJK character classes (such as half-corner Japanese kana) are not distinguished. `listings` write code to external files by redefining `\lst@Append`, so they need to be preserved.

```
6241 \cs_new_protected:Npn \xeCJK_listings_append:nN #1#2
6242 {
6243   \int_add:Nn \lst@length { #1 - 1 }
6244   \lst@Append #2
6245 }
```

`_xeCJK_listings_process_letter:nN` Distinguish Chinese characters and western letters in the `letter` class.
`_xeCJK_listings_process_other:nN`

```
6246 \cs_new_protected:Npn \xeCJK_listings_process_letter:nN
6247 {
6248   \lst@whitespacefalse
6249   \bool_if:NTF \l_xeCJK_listings_letter_bool
6250   { \lst@lettertrue }
6251   {
6252     \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
6253     \bool_set_true:N \l_xeCJK_listings_letter_bool
6254   }
6255   \xeCJK_listings_append:nN
6256 }
6257 \bool_new:N \l_xeCJK_listings_letter_bool
6258 \cs_new_protected:Npn \xeCJK_listings_process_other:nN #1#2
6259 {
6260   \lst@whitespacefalse
6261   \bool_if:NTF \l_xeCJK_listings_letter_bool
6262   {
6263     \lst@Output \lst@letterfalse
6264     \bool_set_false:N \l_xeCJK_listings_letter_bool
6265   }
6266   { \lst@ifletter \lst@Output \lst@letterfalse \fi: }
6267   \cs_set_eq:NN \lst@lastother #2
6268   \xeCJK_listings_append:nN {#1} #2
6269 }
```

`_xeCJK_listings_process_breaklines_CJK:nN` When `breaklines` option is used, the previous single text is output immediately for line breaking, and sets the punctuation with its preceding/after

`_xeCJK_listings_process_FullLeft:nN` CJK text is put in the same box to keep the forbidden rule. But cannot distinguish letter and other.

`_xeCJK_listings_process_FullRight:nN`

```
6270 \cs_new_protected:Npn \xeCJK_listings_process_breaklines_CJK:nN
6271 {
6272   \lst@whitespacefalse
6273   \bool_if:NTF \l_xeCJK_listings_letter_bool
6274   {
6275     \int_compare:nNnF \l_xeCJK_listings_flag_int = 2 { \lst@Output }
6276     \lst@lettertrue
6277   }
6278   {
6279     \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
6280     \bool_set_true:N \l_xeCJK_listings_letter_bool
6281   }
6282   \int_set_eq:NN \l_xeCJK_listings_flag_int \c_one_int
6283   \xeCJK_listings_append:nN
6284 }
6285 \cs_new_protected:Npn \xeCJK_listings_process_FullLeft:nN #1#2
```

Section 5 *xeCJK*
6286 {
6287 \lst@whitespacefalse

```

6288 \bool_if:NTF \l xeCJK_listings_letter_bool
6289 {
6290   \int_compare:nNnF \l xeCJK_listings_flag_int = 2
6291   {
6292     \int_compare:nNnTF \l xeCJK_listings_flag_int = 3
6293     { \bool_if:NT \l xeCJK_punct_breakable_bool { \lst@Output } }
6294     { \lst@Output }
6295   }
6296   \lst@lettertrue
6297 }
6298 {
6299   \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi :
6300   \bool_set_true:N \l xeCJK_listings_letter_bool
6301 }
6302 \int_set:Nn \l xeCJK_listings_flag_int { 2 }
6303 \xeCJK_listings_append:nN {#1} #2
6304 }
6305 \cs_new_protected:Npn \xeCJK_listings_process_FullRight:nN #1#2
6306 {
6307   \lst@whitespacefalse
6308   \bool_if:NTF \l xeCJK_listings_letter_bool
6309   {
6310     \int_compare:nNnT \l xeCJK_listings_flag_int < 2
6311     { \xeCJK_punct_if_long:NT #2 { \lst@Output } }
6312     \lst@lettertrue
6313   }
6314   {
6315     \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
6316     \bool_set_true:N \l xeCJK_listings_letter_bool
6317   }
6318   \int_set:Nn \l xeCJK_listings_flag_int { 3 }
6319   \xeCJK_listings_append:nN {#1} #2
6320 }
6321 \int_new:N \l xeCJK_listings_flag_int

\lst@AppendLetter 6322 \cs_set_protected:Npn \lst@AppendLetter
\lst@AppendOther 6323 {
6324   \bool_if:NTF \l xeCJK_listings_letter_bool
6325   {
6326     \lst@Output \lst@lettertrue
6327     \bool_set_false:N \l xeCJK_listings_letter_bool
6328   }
6329   { \reverse_if:N \lst@ifletter \lst@OutputOther \lst@lettertrue \fi: }
6330   \lst@ifbreaklines \int_zero:N \l xeCJK_listings_flag_int \fi:
6331   \lst@Append
6332 }
6333 \cs_set_protected:Npn \lst@AppendOther
6334 {
6335   \bool_if:NTF \l xeCJK_listings_letter_bool
6336   {
6337     \lst@Output \lst@letterfalse
6338     \bool_set_false:N \l xeCJK_listings_letter_bool
6339   }
6340   { \lst@ifletter \lst@Output \lst@letterfalse \fi: }
6341   \lst@ifbreaklines \int_zero:N \l xeCJK_listings_flag_int \fi:
6342   \tex_futurelet:D \lst@lastother \lst@Append
6343 }

\_xeCJK_listings_process_CM:nN CM class is processed as letter without adding \lst@length.
6344 \cs_new_protected:Npn \xeCJK_listings_process_CM:nN
6345 {
6346   \reverse_if:N \lst@ifflexible
6347   \bool_gset_true:N \g xeCJK_listings_CM_bool
6348   \fi:
6349   \xeCJK_listings_process_letter:nN
6350 }

```

`\xeCJK_listings_output_CM:` When using the `columns=fixed` option, `listings` will add `\hss` between each character in the output box, which breaks X_YTEX to combine the basic word and the combination mark correctly.

```

6351 \cs_new_protected:Npn \xeCJK_listings_output_CM:
6352   {
6353     \reverse_if:N \lst@iflexible
6354     \bool_if:NT \g xeCJK_listings_CM_bool
6355     {
6356       \bool_gset_false:N \g xeCJK_listings_CM_bool
6357       \xeCJK_cs_clear:N \lst@FillOutputBox
6358       \cs_set_eq:NN \CJKglue \tex_hss:D
6359     }
6360   \fi:
6361 }
6362 \bool_new:N \g xeCJK_listings_CM_bool

```

`\xeCJK_listings_peek_active_loop:TF` `\linline` distinguishes whether the first character in the argument is an **active** class or not by determining whether it is used in the argument of other macros. If this first character is not in the `listings` predefined symbol table, the determination will be faulty. We skip these characters here with a loop.

```

6363 \cs_new_protected:Npn \xeCJK_listings_peek_active_loop:TF #1#2#3
6364   {
6365     \token_if_active:NTF #3
6366     { #1#3 }
6367     {
6368       \token_if_cs:NTF #3
6369       { #2#3 }
6370       {
6371         \int_compare:nNnTF {`#3 } > { \l xeCJK_listings_max_char_int }
6372         { \xeCJK_listings_peek_active_loop:TF { #1#3 } { #2#3 } } 6373
6373         { #2#3 }
6374       }
6375     }
6376   }
6377 \cs_set_eq:NN \lst@ifNextCharActive \xeCJK_listings_peek_active_loop:TF

```

`\xeCJK_listings_rescan:Nn` When `\linline` is used in the parameter `listings` will use a loop to take the characters in `\linline` parameter one by one.

`\xeCJK_listings_inside_convert:nw` is set to the active character. We can use `\tl_set_rescan:Nnn` to complete the `\catcode` conversion here to avoid converting

`\xeCJK_listings_inline_group:w` `\charcode` over 255 are set as active characters.

```

6378 \cs_new_protected:Npn \xeCJK_listings_rescan:Nn #1#2
6379   {
6380     \xeCJK_listings_set_escape:
6381     \tl_set:Nn \l xeCJK_tmp_tl {#2}
6382     \xeCJK_listings_escape_backslash:
6383     \tl_set_rescan:Nno #1 { } { \l xeCJK_tmp_tl }
6384   }
6385 \cs_new_protected:Npn \xeCJK_listings_inside_convert:nw #1 ~ \@empty
6386   {
6387     \xeCJK_listings_rescan:Nn \l xeCJK_tmp_tl {#1}
6388     \tl_put_right:No \lst@arg { \l xeCJK_tmp_tl } 6389
6389   }
6390 \cs_set_eq:NN \lst@InsideConvert@ \xeCJK_listings_inside_convert:nw
6391 \cs_new_protected:Npn \xeCJK_listings_inline_group:w
6392   {
6393     \exp_after:wN \xeCJK_listings_inline_group:n
6394     \exp_after:wN { \if_int_compare:w ` } = \c_zero_int \fi:
6395   }
6396 \cs_set_eq:NN \lst@InlineGJ \xeCJK_listings_inline_group:w
6397 \cs_new_protected:Npn \xeCJK_listings_inline_group:n #1
6398   {
6399     \xeCJK_listings_rescan:Nn \lst@arg {#1}
6400     \lst@InlineGJEnd
6401   }

```

`\xeCJK_listings_set_escape`: Due to our modification above, we need to keep `\` for escaping some TEX special characters in `\lstinline` parameter, consistent with the original macro package.

```

6402 \group_begin:
6403 \cs_set:Npn \xeCJK_tmp:w #1
6404   {
6405     \group_end:
6406     \cs_new_protected:Npn \xeCJK_listings_set_escape:
6407       { \xeCJK_swap_cs:NN #1 \xeCJK_listings_escape:N }
6408     \cs_new_protected:Npn \xeCJK_listings_escape:N ##1
6409       { \cs_if_eq:NNTF #1 ##1 { \xeCJK_listings_escape:N } {##1} }
6410   }
6411 \use:n
6412   {
6413     \char_set_catcode_active:N \
6414     \xeCJK_tmp:w
6415   }
6416   { \ }

```

`_xeCJK_listings_escape_backslash`: `\catcode` of `12` `\` requires double-case escape.

```

6417 \cs_new_protected:Npx \xeCJK_listings_escape_backslash:
6418   {
6419     \tl_replace_all:Nnn \exp_not:N \l xeCJK_tmp_tl
6420     { \c_backslash_str }
6421     { \c_backslash_str \c_backslash_str }
6422   }
6423 </listings>
6424 <@@=xunadd>

```

5.21 xunicode-addon

```
6425 <*xunicode>
```

The `xunicode` definition of the encoding-related symbolic command is in the form of `\char "0022\relax`. For example `\textbar` is expanded to `\char "007C\relax` and definitions such as the following are invalid.

```
\DeclareUTFcomposite[\UTFencname]{x1EBF}{\}{\^e}
```

The changes we make here are to define the symbol commands as actual characters and to make the above definitions effective. In addition, when using these symbolic commands, first determine whether the corresponding character exists in the current font, and if not, use the default settings of these symbolic commands.

```

6426 \bool_lazy_or:nnF
6427   { \sys_if_engine_xetex_p: }
6428   { \sys_if_engine_luatex_p: }
6429   {
6430     \msg_new:nnnn { xunicode-addon } { xetex-luatex }
6431     { this~package~requires~either~XeTeX~or~LuaTeX~to~function. }
6432     {
6433       You~must~change~your~typesetting~engine~to,~e.g.,\
6434       "xelatex"~or~"lualatex"~instead~of~plain~"latex"~or~"pdflatex".
6435     }
6436     \msg_critical:nn { xunicode-addon } { xetex-luatex }
6437   }
6438 \RequirePackage { xparse }

```

The macro package option is the name of the code.

```

6439 \clist_new:N \g xunadd_encname_clist
6440 \tl_if_exist:NT \UTFencname
6441   { \clist_gput_right:Nx \g xunadd_encname_clist { \UTFencname } }
6442 \DeclareOption*
6443   { \clist_gput_right:No \g xunadd_encname_clist \CurrentOption }

```


If `xunicode` has already been called, reset the encoding command corresponding to `\UTFencname` at the end of the macro package. Otherwise set `\UTFencname` if `uaLATEX` is used, some settings are needed to make `xunicode` available. `6445 \@ifpackageloaded { xunicode } { }`

```

6446 {
6447   \clist_get:NNF \g_xunadd_encname_clist \UTFencname
6448   {
6449     \cs_if_exist:NTF \UnicodeEncodingName
6450     { \tl_set:Nx \UTFencname { \UnicodeEncodingName } }
6451     {
6452       \sys_if_engine_xetex:TF
6453       { \tl_set:Nn \UTFencname { EU1 } }
6454       { \tl_set:Nn \UTFencname { EU2 } }
6455     }
6456     \clist_gset_eq:NN \g_xunadd_encname_clist \UTFencname
6457   }
6458   \sys_if_engine_xetex:TF
6459   { \RequirePackage { xunicode } }
6460   {
6461     \cs_set_eq:NN \xunadd_tmp:w \XeTeXpicfile
6462     \cs_set_eq:NN \XeTeXpicfile \prg_do_nothing:
6463     \RequirePackage { xunicode }
6464     \cs_set_eq:NN \XeTeXpicfile \xunadd_tmp:w
6465   }
6466 }
6467 \AtEndOfPackage { \xunadd_reload:N \g_xunadd_encname_clist }

```

The `\ReloadXunicode` parameter can be multiple encodings, setting the commands corresponding to these encodings. If the encoding is not pre-declared, an error warning is given.

```

6468 \RenewDocumentCommand \ReloadXunicode { m }
6469 {
6470   \clist_set:Nx \l_xunadd_encname_clist {#1}
6471   \xunadd_reload:N \l_xunadd_encname_clist
6472 }
6473 \cs_new_protected:Npn \xunadd_reload:N #1
6474 {
6475   \cs_set_eq:NN \xunadd_tmp:w \iftipaonetoken
6476   \cs_set_eq:NN \iftipaonetoken \scan_stop:
6477   \use:e
6478   {
6479     \ExplSyntaxOff
6480     \char_set_catcode_letter:n { 64 }
6481     \exp_not:N \clist_map_function:NN \exp_not:N #1 \xunadd_reload_aux:n
6482     \bool_if:NTF \l_kernel_expl_bool
6483     { \ExplSyntaxOn }
6484     { \ExplSyntaxOff }
6485     \char_set_catcode:nn { 64 } { \char_value_catcode:n { 64 } }
6486   }
6487   \cs_set_eq:NN \iftipaonetoken \xunadd_tmp:w
6488 }
6489 \cs_new_protected:Npn \xunadd_reload_aux:n #1
6490 {
6491   \cs_if_exist:cTF { T@ #1 }
6492   {
6493     \tl_set:Nn \UTFencname {#1}
6494     \clist_if_in:NnF \g_xunadd_encname_clist {#1}
6495     { \clist_gput_right:Nn \g_xunadd_encname_clist {#1} }
6496     \file_input:n { xunicode.sty }
6497     \file_input:n { xunicode-extra.def }
6498   }
6499   { \msg_error:nnn { xunicode-addon } { encoding-unknown } {#1} }
6500 }
6501 \clist_new:N \l_xunadd_encname_clist
6502 \msg_new:nnn { xunicode-addon } { encoding-unknown }
6503 { Encoding~scheme~"#1"~unknown. }
6504 {

```



```

6505   You~may~use \\\
6506   \token_to_str:N \usepackage [ #1 , \encodingdefault ] \fontenc\} \\\
6507   before~xunicode-addon~or~xunicode.
6508   }

```

`\DeclareUTFmathsymbols` After defining text symbols as `\protected` macros, a little extra processing is needed for compatibility with `hyperref`'s bookmark function.

```

6509 \RenewDocumentCommand \DeclareUTFmathsymbols { m }
6510 {
6511   \bool_if:NT \l_xunadd_math_as_UTF_text_bool
6512   {
6513     \seq_map_inline:Nn \l_xunadd_math_as_UTF_text_seq
6514     { \xunadd_declare_math_as_UTF_text:n {##1} }
6515     \bool_set_false:N \l_xunadd_math_as_UTF_text_bool
6516   }
6517 }
6518 \seq_new:N \l_xunadd_math_as_UTF_text_seq
6519 \seq_set_from_clist:Nn \l_xunadd_math_as_UTF_text_seq
6520 { hbar , Finv , aleph , beth , gimel , daleth , Game }
6521 \bool_new:N \l_xunadd_math_as_UTF_text_bool
6522 \RenewDocumentCommand \UseMathAsText { }
6523 {
6524   \math@s@text@true
6525   \bool_set_true:N \l_xunadd_math_as_UTF_text_bool
6526 }
6527 \@onlypreamble \UseMathAsText
6528 \cs_new_protected:Npn \xunadd_declare_math_as_UTF_text:n #1
6529 {
6530   \cs_if_exist:cTF {#1}
6531   {
6532     \cs_new_eq:cc { keepmathUTF #1 } {#1}
6533     \cs_gset_protected:cpx {#1}
6534     {
6535       \exp_not:N \mode_if_math:TF
6536       { \exp_not:c { keepmathUTF #1 } }
6537       { \exp_not:c { text #1 } }
6538     }
6539     \tl_put_right:Nx \l_xunadd_hyperref_hook_tl
6540     { \cs_set_eq:NN \exp_not:c { #1 } \exp_not:c { text #1 } }
6541   }
6542   { \cs_new:cpx {#1} { \exp_not:c { text #1 } } }
6543 }
6544 \tl_new:N \l_xunadd_hyperref_hook_tl
6545 \AtBeginDocument
6546 {
6547   \cs_if_free:NF \pdfstringdefDisableCommands
6548   { \pdfstringdefDisableCommands { \l_xunadd_hyperref_hook_tl } }
6549 }

```

`\xunadd_glyph_if_exist_p:n` Determines if the character is present in the current font.
`\xunadd_glyph_if_exist:nTF`

```

6550 \prg_new_conditional:Npnn \xunadd_glyph_if_exist:n #1 { p , T , F , TF }
6551 {
6552   \tex_iffontchar:D \tex_font:D \tex_numexpr:D #1 \scan_stop:
6553   \prg_return_true: \else: \prg_return_false: \fi:
6554 }

```

`\UndeclareUTFcharacter` undeclare UTFcharacter command #3 under encoding #1.

```

6555 \RenewDocumentCommand \UndeclareUTFcharacter { O { \UTFenname } m m }
6556 {
6557   \xunadd_if_csname:nTF {#3}
6558   { \UndeclareTextCommand {#3} }
6559   { \exp_args:Nc \UndeclareTextCommand { \tl_to_str:n {#3} } }
6560   {#1}
6561 }

```

`\UndeclareUTFcomposite` Unicode the composite symbol command `#3{#4}` under `#1`.

```
6562 \RenewDocumentCommand \UndeclareUTFcomposite { O { \UTFencname } m m m m }
6563 {
6564   \xunadd_if_csname:nTF {#3}
6565   { \xunadd_undeclare_composite:Nnnn #3 }
6566   { \exp_args:Nc \xunadd_undeclare_composite:Nnnn { \tl_to_str:n {#3} } }
6567   {#1} {#4} {#2}
6568 }
6569 \cs_new_protected:Npn \xunadd_undeclare_composite:Nnnn #1#2#3#4
6570 { \cs_undefine:c { \xunadd_composite_cs:Nnn #1 {#2} {#3} } }
```

```
\xunadd_composite_cs:Nnn 6571 \cs_new:Npx \xunadd_composite_cs:Nnn #1#2#3
\xunadd_composite_cs:nnn 6572 { \c_backslash_str #2 \exp_not:N \token_to_str:N #1 - \exp_not:N \tl_to_str:n {#3} }
6573 \cs_new:Npx \xunadd_composite_cs:nnn #1#2#3
6574 { \c_backslash_str #2 #1 - \exp_not:N \tl_to_str:n {#3} }
```

`\xunadd_if_csname:nTF` determines if `#1` can be used as the name of the control sequence. This is because `xunicode` uses the following definition.

```
\DeclareUTFcharacter[\UTFencname]{x0149}{'n}
6575 \prg_new_conditional:Npnn \xunadd_if_csname:n #1 { TF }
6576 {
6577   \tl_if_single_token:nTF {#1}
6578   {
6579     \token_if_cs:NTF #1
6580     { \prg_return_true: }
6581     {
6582       \token_if_active:NTF #1
6583       { \prg_return_true: }
6584       { \prg_return_false: }
6585     }
6586   }
6587   { \prg_return_false: }
6588 }
```

`\DeclareUTFcharacter` defines the symbol command `#3` under the code `#1`, and the Unicode of its corresponding symbol is `#2`.

```
6589 \RenewDocumentCommand \DeclareUTFcharacter { O { \UTFencname } m m }
6590 {
6591   \cs_if_exist_use:cF
6592   { xunadd_restore_ \tl_to_str:n {#3} : }
6593   {
6594     \xunadd_if_csname:nTF {#3}
6595     { \xunadd_declare_character:Nnn #3 }
6596     { \xunadd_declare_character:cnn { \tl_to_str:n {#3} }
6597       {#1} {#2}
6598     }
6599   }
```

`\xunadd_restore_cmd:N` restores `\hbar` and `\nobreakspace` as originally defined.

```
6600 \cs_new_protected:cpn
6601 { xunadd_restore_ \tl_to_str:n { \hbar } : }
6602 { \xunadd_restore_cmd:N \hbar }
6603 \cs_new_protected:cpn
6604 { xunadd_restore_ \tl_to_str:n { \nobreakspace } : }
6605 { \xunadd_restore_cmd:N \nobreakspace }
6606 \cs_new_protected:Npn \xunadd_restore_cmd:N #1
6607 { \xunadd_restore_cmd:Ne #1 { ? - \token_to_str:N #1 } }
6608 \cs_new_protected:Npn \xunadd_restore_cmd:Nn #1#2
6609 {
6610   \cs_if_free:cF {#2}
6611   { \xunadd_restore_cmd:Nc #1 {#2} }
6612 }
6613 \cs_new_protected:Npn \xunadd_restore_cmd:NN #1#2
6614 {
6615   \cs_gset_eq:NN #1 #2
6616   \cs_undefine:N #2
6617 }
```

```
6618 \cs_generate_variant:Nn \xunadd_restore_cmd:Nn { Ne }
6619 \cs_generate_variant:Nn \xunadd_restore_cmd:NN { Nc }
```

`\xunadd_declare_character:Nnn` via `\tex_Uchar:D` Get the actual character corresponding to symbolic command #1 under encoding #2 directly from Unicode #3.

The parameter format of `\DeclareUTFSymbol` is exactly the same as `\DeclareTextSymbol`.

```
6620 \cs_new_protected:Npn \xunadd_declare_character:Nnn #1#2#3
6621   {
6622     \xunadd_provide_text_command_default:N #1
6623     \exp_after:wN \xunadd_declare_character:NNen
6624     \tex_Uchar:D \xunadd_check_slot:n {#3} \exp_stop_f:
6625     #1 { \token_to_str:N #1 } {#2}
6626   }
6627 \cs_generate_variant:Nn \xunadd_declare_character:Nnn { c }
```

`\DeclareUTFSymbol` `\DeclareUTFCommand` can only be used to define symbolic commands without parameters.

```
\DeclareUTFCommand
6628 \NewDocumentCommand \DeclareUTFSymbol { m O { \UTFencname } m }
6629   { \xunadd_declare_character:Nnn #1 {#2} {#3} }
6630 \NewDocumentCommand \DeclareUTFCommand { m O { \UTFencname } m }
6631   { \xunadd_text_command:Nonn #1 { \token_to_str:N #1 } {#2} {#3} }
6632 \cs_new_protected:Npn \xunadd_text_command:Nnnn #1#2#3#4
6633   { \DeclareTextCommand #1 {#3} { \xunadd_text_command:nn {#2} {#4} } }
6634 \cs_generate_variant:Nn \xunadd_text_command:Nnnn { No }
6635 \cs_new_protected:Npn \xunadd_text_command:nn #1#2
6636   {
6637     \xunadd_begin_hook:nn {#1} {#2}
6638     #2
6639     \xunadd_end_hook:nn {#1} {#2}
6640   }
```

`\xunadd_provide_text_command_default:N` If control sequence #1 already exists but is not a symbolic command, `xunicode` defines it as a symbolic command under `\UTFencname` encoding. However, if these control sequences are used after the encoding has been converted, `NFSS` will report an error. For this reason it is necessary to give the default definitions of these symbolic commands with the same meaning as the original ones. These commands include

<code>\nobreakspace</code>	macro:->\protect \nobreakspace
<code>\copyright</code>	macro:->\protect \copyright
	<code>\AAmacro:->\r A</code>
<code>\aa</code>	macro:->\r a
<code>\textrhookopeno</code>	\long macro:->\textrethookbelow { \textopeno }
<code>\hbar</code>	macro:->{\mathchar '26\mkern -9muh}
<code>\textao lig</code>	macro:->{a\kern -.25em o}

The more influential ones are `\nobreakspace`, `\copyright` and `\hbar`.

```
6641 \cs_new_protected:Npn \xunadd_provide_text_command_default:N #1
6642   {
6643     \cs_if_exist:cF { ? \token_to_str:N #1 }
6644     {
6645       \cs_if_free:cF { ? - \token_to_str:N #1 }
6646       {
6647         \exp_args:NNv \ProvideTextCommandDefault #1
6648         { ? - \token_to_str:N #1 }
6649       }
6650     }
6651   }
```

`\xunadd_declare_character:NNnn` determines whether the actual character #1 exists in the current font when using the symbol command #2 under encoding #4. If it does not exist, it is converted to the encoding set in `\DeclareTextSymbolDefault` or the command set in `\DeclareTextCommandDefault`.

```
6652 \cs_new_protected:Npn \xunadd_declare_character:NNnn #1#2#3#4
6653   { \DeclareTextCommand #2 {#4} { \xunadd_text_character:nN {#3} {#1} } }
6654 \cs_new_protected:Npn \xunadd_text_character:nN #1#2
6655   {
```

```
6656 \xunadd_begin_hook:nn {#1} {#2}  
6657 \xunadd_glyph_if_exist:nTF {`#2 }  
6658 {#2} {\cs_if_exist_use:cF {? #1 } {#2}}
```

```

6659   \xunadd_end_hook:nn {#1} {#2}
6660   }
6661 \cs_generate_variant:Nn \xunadd_declare_character:NNnn { NNe }

```

The Unicode format used in `\xunadd_check_slot:n xunicode` is in a form such as `x0022`, which requires some conversion.

```

6662 \cs_new:Npn \xunadd_check_slot:n #1
6663 {
6664   \int_eval:n
6665   {
6666     \tl_if_head_eq_charcode:nNTF {#1} x
6667     { "\use_none:n #1 } {#1}
6668   }
6669 }

```

`\DeclareUTFcomposite` sets the symbol command `#3` under encoding `#1` with its argument `#4` of the composite corresponding to the symbol whose Unicode is `#2`.

```

6670 \RenewDocumentCommand \DeclareUTFcomposite { O { \UTFencname } m m m m }
6671 {
6672   \xunadd_if_csname:nTF {#3}
6673   { \xunadd_declare_composite:Nnnn #3 }
6674   { \xunadd_declare_composite:cnnn { \tl_to_str:n {#3} }
6675     {#1} {#4} {#2}
6676 }

```

`_xunadd_declare_composite:Nnnn \tex_afterassignment:D` is used here because `xunicode` has the following definition.

```

\DeclareUTFcomposite[\UTFencname]{x02E8\char"02E5}{\tonebar}{25}
\DeclareUTFcomposite[\UTFencname]{x02E5\char"02E8}{\tonebar}{52}

```

The definition of the compound symbol command is `\chardef` which facilitates the determination of the presence of the following characters.

```

6677 \cs_new_protected:Npn \xunadd_declare_composite:Nnnn #1#2#3#4
6678 {
6679   \tex_afterassignment:D \use_none_delimit_by_q_stop:w
6680   \xunadd_chardef:cn { \xunadd_composite_cs:Nnn #1 {#2} {#3} }
6681   { \xunadd_check_slot:n {#4} }
6682   \q_stop
6683 }
6684 \cs_new_protected:Npn \xunadd_chardef:Nn #1#2
6685 { \tex_chardef:D #1 = \tex_numexpr:D #2 \scan_stop: }
6686 \cs_generate_variant:Nn \xunadd_chardef:Nn { c }
6687 \cs_generate_variant:Nn \xunadd_declare_composite:Nnnn { c }

```

`\DeclareUTFCompositeCommand` sets the symbolic command `#1` under code `#2` and its argument `#3` with the composite corresponding result `#4`. It cannot be defined directly with `\DeclareTextCompositeCommand`, it conflicts with our mechanism.

```

6688 \NewDocumentCommand \DeclareUTFCompositeCommand { m O { \UTFencname } m m }
6689 { \cs_set_protected:cpn { \xunadd_composite_cs:Nnn #1 {#2} {#3} } {#4} }

```

`\DeclareUTFCompositeSymbol` sets the symbol command `#1` under code `#2` with its argument `#3` with the composite corresponding result `#4`. It cannot be defined directly with `\DeclareTextComposite`, it conflicts with our mechanism.

```

6690 \NewDocumentCommand \DeclareUTFCompositeSymbol { m O { \UTFencname } m m }
6691 {
6692   \xunadd_chardef:cn { \xunadd_composite_cs:Nnn #1 {#2} {#3} }
6693   { \xunadd_check_slot:n {#4} }
6694 }

```

`\DeclareUTFComposite` sets `#1` to a composite symbol command with one argument under code `#2`.

```

6695 \NewDocumentCommand \DeclareUTFComposite { m O { \UTFencname } }
6696 { \use:e { \xunadd_declare_composite:Nnn \exp_not:N #1 { \token_to_str:N #1 } {#2} } }

```

`\DeclareUTFEncodedAccent #1` is the accent command, `#2` is the encoding, `#3` is the Unicode of the combined accent mark, `#4` is the Unicode of the basic accent mark. when

If #1's argument is empty #4 is output, otherwise it is the combination of #1's argument and #3.

```
6697 \NewDocumentCommand \DeclareUTFEncodedAccent { m O { \UTFencname } m m }  
6698 { \xunadd_declare_encoded:NNnnn \xunadd_combine_accent:nnNnn #1 {#2} {#3} {#4} }
```

`\DeclareUTFEncodedAccents` #1 is the accent command, #2 is the encoding, #3 and #4 are both Unicode with combined accent marks. output #1 with the combination of #3 #4.

```
6699 \NewDocumentCommand \DeclareUTFEncodedAccents { m O { \UTFencname } m m }
6700   { \xunadd_declare_encoded:NNnnn \xunadd_combine_accents:nnNn #1 {#2} {#3} {#4} }
```

`\DeclareUTFEncodedSymbol` #1 is the symbol command with parameters, #2 is the encoding, #3 is the Unicode of the combined symbol #4 is the Unicode of the basic symbol. when

If #1's argument is empty #4 is output, otherwise it is the combination of #1's argument and #3.

```
6701 \NewDocumentCommand \DeclareUTFEncodedSymbol { m O { \UTFencname } m m }
6702   { \xunadd_declare_encoded:NNnnn \xunadd_combine_symbol:nnNn #1 {#2} {#3} {#4} }
```

`\DeclareUTFEncodedCircle` #1 is the circle symbol command with parameters, #2 is the encoding, #3 is the Unicode of the combined circle symbol, #4 is the circle symbol of the

Unicode. output #4 when #1 argument is empty, otherwise it is the combination of #1 argument and #4.

```
6703 \NewDocumentCommand \DeclareUTFEncodedCircle { m O { \UTFencname } m m }
6704   { \xunadd_declare_encoded:NNnnn \xunadd_combine_circle:nnNNn #1 {#2} {#3} {#4} }
```

`\DeclareEncodedCompositeCharacter` #1 #2 #3 #4

```
6705 \RenewDocumentCommand \DeclareEncodedCompositeCharacter { m m m m m }
6706   { \DeclareUTFEncodedSymbol #2 [#1] {"#3"} {"0#4"} }
```

`\DeclareEncodedCompositeAccents` #1 #2 #3 #4

```
6707 \RenewDocumentCommand \DeclareEncodedCompositeAccents { m m m m m }
6708   { \DeclareUTFEncodedAccents #2 [#1] {"#4"} {"#3"} }
```

`\DeclareUTFDoubleEncodedAccent` #1 #2 #3 #4

```
6709 \NewDocumentCommand \DeclareUTFDoubleEncodedAccent { m O { \UTFencname } m m }
6710 { \xunadd_declare_encoded:NNnnn \xunadd_combine_double_accent:nnNn #1 {#2} {#3} {#4} }
```

`\DeclareUTFDoubleEncodedSymbol` #1 #2 #3 #4

```
6711 \NewDocumentCommand \DeclareUTFDoubleEncodedSymbol { m O { \UTFencname } m m }
6712 { \xunadd_declare_encoded:NNnnn \xunadd_combine_double_symbol:nnNNn #1 {#2} {#3} {#4} }
```

`_xunadd_declare_composite:Nnn` gets the actual character directly from the Unicode of the accent mark via the lowercase trick.

```
6713 \cs_new_protected:Npn \xunadd_declare_composite:Nnn #1#2#3
6714   { \DeclareTextCommand #1 {#3} { \xunadd_text_composite:nnn {#2} {#3} } }
```

`_xunadd_text_composite:nnn` #1 #2 #3

```
6716 {
6717   \xunadd_begin_hook:nn {#1} {#3}
6718   \cs_if_exist:cTF { \xunadd_composite_cs:nnn {#1} {#2} {#3} }
6719     {
6720       \xunadd_text_composite:cnn
6721       { \xunadd_composite_cs:nnn {#1} {#2} {#3} } {#1} {#3}
6722     }
6723     { \cs_if_exist_use:cTF { ? #1 } { { {#3} } {#3} } }
6724     \xunadd_end_hook:nn {#1} {#3}
6725   }
6726 \cs_new_protected:Npn \xunadd_text_composite:Nnn #1#2#3
6727 {
6728   \token_if_chardef:NTF #1
6729   {
6730     \xunadd_glyph_if_exist:nTF {#1}
6731     {#1} { \cs_if_exist_use:cTF { ? #2 } { { {#3} } {#3} } }
6732   }
6733   {#1}
6734 }
6735 \cs_generate_variant:Nn \xunadd_text_composite:Nnn { c }
```

`_xunadd_declare_encoded:NNnnn` via `\tex_Uchar:D` The actual character is obtained directly from the Unicode of the accented symbol.

```
6736 \cs_new_protected:Npn \xunadd_declare_encoded:NNnnn #1#2#3#4#5
6737 {
6738   \exp_after:wN \xunadd_declare_encoded:NNNNNee
6739   \tex_Uchar:D \xunadd_check_slot:n {#4} \exp_after:wN \exp_stop_f:
6740   \tex_Uchar:D \xunadd_check_slot:n {#5} \exp_stop_f:
6741   #1 #2 { \token_to_str:N #2 } {#3}
6742 }
```

```
6743 \cs_new_protected:Npn \xunadd_declare_encoded:NNNNNnn #1#2#3#4#5#6
6744   { \DeclareTextCommand #4 {#6} { #3 {#5} {#6} {#1} {#2} } }
6745 \cs_generate_variant:Nn \xunadd_declare_encoded:NNnnn { c }
6746 \cs_generate_variant:Nn \xunadd_declare_encoded:NNNNNnn { NNNNNee }
```


`\xunadd_text_combine:NnnNNn` If the compound of accent command `#2` with its parameter `#6` has been set by `\DeclareUTFComposite` and the character exists in the current font, use it directly. Otherwise, use the combine command.

```

6747 \cs_new_protected:Npn \xunadd_text_combine:NnnNNn #1#2#3#4#5#6
6748 {
6749   \xunadd_begin_hook:nn {#2} {#6}
6750   \cs_if_exist:cTF { \xunadd_composite_cs:nnn {#2} {#3} {#6} }
6751   {
6752     \xunadd_text_combine:cNnNNn
6753     { \xunadd_composite_cs:nnn {#2} {#3} {#6} } #1 {#2} {#4} {#5} {#6}
6754   }
6755   { #1 {#6} {#2} {#4} {#5} }
6756   \xunadd_end_hook:nn {#2} {#6}
6757 }
6758 \cs_new_protected:Npn \xunadd_text_combine:NNnNNNn #1#2#3#4#5#6
6759 {
6760   \token_if_chardef:NTF #1
6761   { \xunadd_glyph_if_exist:nTF {#1} {#1} { #2 {#6} {#3} {#4} {#5} } }
6762   {#1}
6763 }
6764 \cs_generate_variant:Nn \xunadd_text_combine:NNnNNNn { c }

```

```

\xunadd_combine_symbol:nnNNn 6765 \cs_new_protected:Npn \xunadd_combine_symbol:nnNNn
6766 { \xunadd_text_combine:NnnNNn \xunadd_add_symbol:nnnNN }
6767 \cs_new_protected:Npn \xunadd_add_symbol:nnNN #1#2#3#4
6768 {
6769   \tl_if_blank:nTF {#1}
6770   {
6771     \xunadd_glyph_if_exist:nTF {`#4}
6772     {#4}
6773     { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4 } } }
6774   }
6775   {
6776     \xunadd_glyph_if_exist:nTF {`#3}
6777     { #1#3 }
6778     { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } } }
6779   }
6780 }

```

`\xunadd_combine_accent:nnNNn` If neither `#3` of the combined accent mark nor `#4` of the basic accent mark exists in the current font, then convert to `\Declare-`

`\xunadd_add_accent:nnnNN` `TextAccentDefault` or use the command set in `\DeclareTextCommandDefault`. XeTeX before version 0.9999 requires `\XeTeXinputnormalization` to be set to 1 to use the actual characters in the font corresponding to the base character and the combination of symbols; XeTeX after version 0.9999 enables this feature by default.

`\XeTeXinputnormalization` seems to be invalid, and it is suspected that the `HarfBuzz` library is used instead of `ICU` for font typesetting for the sake of¹⁸.

```

6781 \cs_new_protected:Npn \xunadd_combine_accent:nnNNn
6782 { \xunadd_text_combine:NnnNNn \xunadd_add_accent:nnnNN }
6783 \cs_new_protected:Npn \xunadd_add_accent:nnNN #1#2#3#4
6784 {
6785   \tl_if_blank:nTF {#1}
6786   {
6787     \xunadd_glyph_if_exist:nTF {`#4}
6788     {#4}
6789     { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4 } } }
6790   }
6791   {
6792     \xunadd_glyph_if_exist:nTF {`#3}
6793     { #1#3 }
6794     {
6795       \xunadd_glyph_if_exist:nTF {`#4}
6796       { \add@accent {`#4} {#1} }

```

6797

`{\cs_if_exist_use:cTF {? #2} {{#1}}{#1#3}}`

6798

}

¹⁸ <http://tug.org/pipermail/xetex/2013-July/024579.html>

```

6799     }
6800   }

\unadd_combine_accents:nnNNn 6801 \cs_new_protected:Npn \xunadd_combine_accents:nnNNn
\unadd_add_accents:nnnNN 6802   { \xunadd_text_combine:NnnNNn \xunadd_add_accents:nnnNN }
6803 \cs_new_protected:Npn \xunadd_add_accents:nnNN #1#2#3#4
6804   {
6805     \tl_if_blank:nTF {#1}
6806     { \cs_if_exist_use:cTF { ? #2 } { { {#1} } {#1} }
6807       {
6808         \xunadd_glyph_if_exist:nTF {`#3 }
6809         { \xunadd_glyph_if_exist:nTF {`#4 } }
6810         { \use_ii:nn
6811           { #1#3#4 }
6812           { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3#4 } }
6813         }
6814       }

```

`\xunadd_combine_circle:nnNNn` The number or letter in the circle is reduced appropriately to fit the size of the circle. Use only if `U+25EF` is present in the font

`\xunadd_add_circle:nnNN` The setting here, otherwise it `LATEX` till A setting in the

```

\unadd_add_circle:nN
6815 \cs_new_protected:Npn \xunadd_combine_circle:nnNNn
6816   { \xunadd_text_combine:NnnNNn \xunadd_add_circle:nnnNN }
6817 \cs_new_protected:Npn \xunadd_add_circle:nnNN #1#2#3#4
6818   {
6819     \tl_if_blank:nTF {#1}
6820     {
6821       \xunadd_glyph_if_exist:nTF {`#4 }
6822       {#4}
6823       { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4 } }
6824     }
6825     {
6826       \xunadd_glyph_if_exist:nTF {`#4 }
6827       { \xunadd_add_circle:nN {#1} #4 }
6828       { \cs_if_exist_use:cTF { ? #2 } { { {#1} } {#1} }
6829     }
6830   }
6831 \cs_new_protected:Npn \xunadd_add_circle:nN #1#2
6832   {
6833     \hcoffin_set:Nn \l_xunadd_tmp_coffin {#1}
6834     \hcoffin_set:Nn \l_xunadd_circle_coffin {#2}
6835     \fp_set:Nn \l_xunadd_circle_scale_fp
6836     {
6837       \dim_to_decimal_in_unit:nn
6838       {
6839         \fp_use:N \l_xunadd_circle_ratio_fp
6840         \coffin_wd:N \l_xunadd_circle_coffin
6841       }
6842       { \coffin_wd:N \l_xunadd_tmp_coffin }
6843     }
6844     \coffin_scale:Nnn \l_xunadd_tmp_coffin
6845     { \l_xunadd_circle_scale_fp } { \l_xunadd_circle_scale_fp }
6846     \coffin_attach:NnnNnnnn
6847     \l_xunadd_circle_coffin { hc } { vc }
6848     \l_xunadd_tmp_coffin { hc } { vc } { \c_zero_dim } { \c_zero_dim }
6849     \coffin_typeset:Nnnnn \l_xunadd_circle_coffin
6850     { H } { I } { \c_zero_dim } { \c_zero_dim } 6851
6851   }
6852 \fp_new:N \l_xunadd_circle_scale_fp
6853 \coffin_new:N \l_xunadd_tmp_coffin
6854 \coffin_new:N \l_xunadd_circle_coffin

```

`\setttextcircledratio` Sets the ratio of the width of the text in the circle to the width of the circle, preset to 0.7.

```

6855 \NewDocumentCommand \setttextcircledratio { m }
6856   { \fp_set:Nn \l_xunadd_circle_ratio_fp {#1} }
6857 \fp_new:N \l_xunadd_circle_ratio_fp
6858 \setttextcircledratio { 0.7 }

```

`\xunadd_combine_double_accent:nnNNn` make `\t` and other combination accent marks are placed to the right of the first letter of the argument.

```

6859 \cs_new_protected:Npn \xunadd_combine_double_accent:nnNNn
6860   { \xunadd_text_combine:NnnNNn \xunadd_add_double_accent:nnnNN }
6861 \cs_new_protected:Npn \xunadd_add_double_accent:nnNN #1#2#3#4
6862   {
6863     \tl_if_blank:nTF {#1}
6864     {
6865       \xunadd_glyph_if_exist:nTF {`#4 }
6866       {#4}
6867       { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4 } }
6868     }
6869     {
6870       \xunadd_glyph_if_exist:nTF {`#3 }
6871       { \xunadd_add_double_symbol:nN {#1} #3 }
6872       {
6873         \xunadd_glyph_if_exist:nTF {`#4 }
6874         { \add@accent {`#4 } {#1} }
6875         { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } }
6876       }
6877     }
6878   }

```

`\xunadd_combine_double_symbol:nnNNn` make `\sliding` and other combination accent symbols are placed to the right of the first letter of the argument.

```

6879 \cs_new_protected:Npn \xunadd_combine_double_symbol:nnNNn
6880   { \xunadd_text_combine:NnnNNn \xunadd_add_double_symbol:nnnNN }
6881 \cs_new_protected:Npn \xunadd_add_double_symbol:nnNN #1#2#3#4
6882   {
6883     \tl_if_blank:nTF {#1}
6884     {
6885       \xunadd_glyph_if_exist:nTF {`#4 }
6886       {#4}
6887       { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4 } }
6888     }
6889     {
6890       \xunadd_glyph_if_exist:nTF {`#3 }
6891       { \xunadd_add_double_symbol:nN {#1} #3 }
6892       { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } }
6893     }
6894   }

```

`\xunadd_add_double_symbol:nN` If the first notation of the argument is an alphabetic class, another symbolic class or defined by `\chardef`, the combined symbol is placed to its right; otherwise it is left untouched.

```

6895 \cs_new_protected:Npn \xunadd_add_double_symbol:nN #1#2
6896   {
6897     \tl_if_head_is_N_type:nTF {#1}
6898     {
6899       \exp_after:wN \exp_after:wN \exp_after:wN
6900       \xunadd_add_double_symbol_aux:NnN \exp_after:wN \exp_after:wN
6901       \tl_head:w #1 \q_stop \exp_after:wN { \use_none:n #1 } #2
6902     }
6903     { #1#2 }
6904   }
6905 \cs_new_protected:Npn \xunadd_add_double_symbol_aux:NnN #1#2#3
6906   {
6907     \bool_lazy_any:nTF
6908     {
6909       { \token_if_letter_p:N #1 }
6910       { \token_if_other_p:N #1 }
6911       { \token_if_chardef_p:N #1 }
6912     }
6913     { #1#3#2 }
6914     { #1#2#3 }
6915   }

```

`\AtBeginUTFCommand` sets the hook to be used before and after the symbol command, with optional arguments to specify individual symbol naming. You can use `#1` to refer to the

`\AtEndUTFCommand` The parameter of the combined symbol command or the symbol corresponding to the symbol command.

```

6916 \NewDocumentCommand \AtBeginUTFCommand {s O {} +m }
6917 {
6918   \tl_if_blank:nTF {#2}
6919   {
6920     \IfBooleanTF {#1}
6921     { \xunadd_set_begin_hook:n }
6922     { \xunadd_append_begin_hook:n }
6923   }
6924   { \xunadd_set_begin_hook:nn {#2} }
6925   {#3}
6926 }
6927 \NewDocumentCommand \AtEndUTFCommand {s O {} +m }
6928 {
6929   \tl_if_blank:nTF {#2}
6930   {
6931     \IfBooleanTF {#1}
6932     { \xunadd_set_end_hook:n }
6933     { \xunadd_append_end_hook:n }
6934   }
6935   { \xunadd_set_end_hook:nn {#2} }
6936   {#3}
6937 }

```

```

\xunadd_set_begin_hook:n 6938 \cs_new_protected:Npn \xunadd_set_begin_hook:n
\xunadd_set_end_hook:n 6939 { \tl_set:Nn \l_xunadd_begin_hook_tl }
6940 \cs_new_protected:Npn \xunadd_append_begin_hook:n
6941 { \tl_put_right:Nn \l_xunadd_begin_hook_tl } 6942
\cs_new_protected:Npn \xunadd_set_end_hook:n
6943 { \tl_set:Nn \l_xunadd_end_hook_tl }
6944 \cs_new_protected:Npn \xunadd_append_end_hook:n 6945
{ \tl_put_right:Nn \l_xunadd_end_hook_tl } 6946
\cs_new_protected:Npn \xunadd_set_begin_hook:nn 6947
{ \xunadd_set_cmd_hook:nnn { begin }
6948 \cs_new_protected:Npn \xunadd_set_end_hook:nn
6949 { \xunadd_set_cmd_hook:nnn { end }
6950 \cs_new_protected:Npn \xunadd_set_cmd_hook:nnn #1#2#3
6951 {
6952   \cs_set_protected:cpn
6953   {
6954     \tl_if_single:nTF {#2}
6955     { \use:c { xunadd_#1_csname:n } { \token_to_str:N #2 }
6956     { \xunadd_set_cmd_hook_aux:Nnwn #2 \q_stop {#1} }
6957   } ##1
6958   {#3}
6959 }
6960 \cs_new:Npn \xunadd_set_cmd_hook_aux:Nnwn #1#2 \q_stop #3
6961 { \use:c { xunadd_#3_csname:n } { \token_to_str:N #1 - \tl_to_str:n {#2} } }
6962 \cs_new:Npn \xunadd_begin_csname:n #1 { xunadd_begin_#1_hook:n }
6963 \cs_new:Npn \xunadd_end_csname:n #1 { xunadd_end_#1_hook:n }
6964 \tl_new:N \l_xunadd_begin_hook_tl
6965 \tl_new:N \l_xunadd_end_hook_tl

\xunadd_begin_hook:nn 6966 \cs_new_protected:Npn \xunadd_begin_hook:nn #1#2
\xunadd_end_hook:nn 6967 {
6968   \tl_use:N \l_xunadd_begin_hook_tl
6969   \cs_if_exist_use:cF { \xunadd_begin_csname:n { #1 - \tl_to_str:n {#2} } } 6970
{ \cs_if_exist_use:cF { \xunadd_begin_csname:n {#1} } { \use_none:n } }
6971   {#2}
6972 }
6973 \cs_new_protected:Npn \xunadd_end_hook:nn #1#2
6974 {
6975   \cs_if_exist_use:cF { \xunadd_end_csname:n { #1 -
\tl_to_str:n {#2} } } 6976 { \cs_if_exist_use:cF { \xunadd_end_csname:n
{#1} } { \use_none:n } } 6977 {#2}
6978   \tl_use:N \l_xunadd_end_hook_tl

```

```

6979 }
\DeclareUTFTIPACCommand 6980 \NewDocumentCommand \DeclareUTFTIPACCommand { O { \UTFencname } m }
6981 { \use:e { \ xunadd_text_tipa_command:Nnn \exp_not:N #2 { \token_to_str:N #2 } {#1} }
6982 \cs_new_protected:Npn \ xunadd_text_tipa_command:Nnn #1#2#3
6983 {
6984   \cs_set_eq:cc { UTF/#3#2 } { #3#2 }
6985   \DeclareTextCommand #1 {#3} { \ xunadd_text_tipa_command:nnn {#3} {#2} }
6986 }
6987 \cs_new_protected:Npn \ xunadd_text_tipa_command:nnn #1#2#3
6988 {
6989   \exp_args:Ncc \ xunadd_check_for_tipa:NNNn
6990   { \use_none:n #2 } { UTF/#1#2 } {#3}
6991 }
6992 \cs_new_protected:Npn \ xunadd_check_for_tipa:NNn #1#2#3
6993 {
6994   \tl_if_head_eq_meaning:nNTF {#3} \textipa
6995   {
6996     \exp_after:wN \tipacatchonechar \exp_after:wN
6997     { \exp_after:wN #1 \use_none:n #3 }
6998   }
6999   { #2 {#3} }
7000 }

```

`\xunadd_get_slot:nn #1` is the encoding, `#2` is the text command in the form of `\textendash` or `\v C`, etc., to get their corresponding character encoding.

```

7001 \cs_new_protected:Npn \xunadd_get_slot:nn #1#2
7002   { \ xunadd_get_slot:wn #2 \q_nil \q_stop {#1} }
7003 \cs_new_protected:Npn \ xunadd_get_slot:wn #1#2#3 \q_stop #4
7004   {
7005     \int_set:Nn \l_xunadd_slot_int { -1 }
7006     \bool_set_false:N \l_xunadd_rest_bool 7007
7007     \group_begin: \exp_args:Nccc \group_end:
7008     { \xunadd_get_slot:NNnn }
7009     { #4 \token_to_str:N #1 }
7010     { \ xunadd_composite_cs:Nnn #1 {#4} {#2} }
7011     {#2}
7012     {#3}
7013   }
7014 \int_new:N \l_xunadd_slot_int
7015 \bool_new:N \l_xunadd_rest_bool
7016 \cs_new_protected:Npn \ xunadd_get_slot:NNNnn #1#2#3#4
7017   {
7018     \cs_if_free:NF #1
7019     {
7020       \cs_if_exist:NTF #2
7021       { \ xunadd_get_composite_slot:Nn #2 {#4} }
7022       { \ xunadd_get_character_slot:Nn #1 { #3 #4 } }
7023     }
7024   }
7025 \cs_new_protected:Npn \ xunadd_get_composite_slot:Nn #1#2
7026   {
7027     \token_if_chardef:NT #1
7028     {
7029       \int_set:Nn \l_xunadd_slot_int {#1}
7030       \quark_if_nil:nF {#2}
7031       { \bool_set_true:N \l_xunadd_rest_bool }
7032     }
7033   }
7034 \cs_new_protected:Npn \ xunadd_get_character_slot:Nn #1
7035   {
7036     \exp_after:wN \ xunadd_get_character_slot_aux:wn #1
7037     \ xunadd_text_character:nN \q_nil \q_nil \q_stop 7038
7038   }
7039 \cs_new_protected:Npn \ xunadd_get_character_slot_aux:wn
7040   #1 \ xunadd_text_character:nN #2#3#4 \q_stop #5
7041   {
7042     \quark_if_nil:nF {#2}

```

```

7043 {
7044   \int_set:Nn \l_xunadd_slot_int {`#3}
7045   \quark_if_nil:nF {#5}
7046   { \bool_set_true:N \l_xunadd_rest_bool }
7047 }
7048 }

```

The functions used in the `\xunadd@microtype@is@charx` `microtype` macro package, we implement the functions by patching `\MT@is@charx`.

```

7049 \cs_new_protected_nopar:Npn \xunadd@microtype@is@charx #1 \relax
7050 {
7051   \use:e
7052   { \xunadd_get_slot:nn { \MT@encoding } { \tex_the:D \MT@toks } }
7053   \int_compare:nNnTF \l_xunadd_slot_int < \c_zero_int
7054   { \xunadd@original@is@charx #1 \relax }
7055   {
7056     \cs_set_nopar:Npx \MT@char@ { \int_use:N \l_xunadd_slot_int }
7057     \bool_if:NT \l_xunadd_rest_bool { \MT@norestfalse }
7058   }
7059 }
7060 \cs_new_protected_nopar:Npn \xunadd@microtype@hook
7061 {
7062   \cs_if_free:NF \MT@is@charx
7063   {
7064     \cs_new_eq:NN \xunadd@original@is@charx \MT@is@charx
7065     \cs_set_eq:NN \MT@is@charx \xunadd@microtype@is@charx
7066     \cs_set_eq:NN \MT@warn@unknown@once \use_none:n
7067   }
7068 }
7069 \@ifpackageloaded { microtype }
7070 { \use:n } { \AtBeginDocument }
7071 { \xunadd@microtype@hook }
7072 </xunicode>
7073 <*xunextra>

```

We add the definition of HYPHENATION POINT and TWO-EM DASH, which are classified as CJK punctuation by default.

```

7074 \DeclareUTFSymbol\textthyphenationpoint{"2027}
7075 \DeclareUTFSymbol\texttwoemdash{"2E3A}

```

The following content is taken from `xunicode` and modified as appropriate.

```

7076 \DeclareUTFComposite\textsuperscript
7077 \DeclareUTFComposite\textsubscript
7078 \DeclareUTFEncodedAccent\textsbleftarrow{"20EE}{20FF}
7079 \DeclareUTFEncodedAccent\{"0300}{02CB}
7080 \DeclareUTFEncodedAccent\capitalgrave{"0300}{02CB}
7081 \DeclareUTFEncodedAccent\{"0301}{02CA}
7082 \DeclareUTFEncodedAccent\capitalacute{"0301}{02CA}
7083 \DeclareUTFEncodedAccent\^{"0302}{02C6}
7084 \DeclareUTFEncodedAccent\capitalcircumflex{"0302}{02C6}
7085 \DeclareUTFEncodedAccent\~{"0303}{02DC}
7086 \DeclareUTFEncodedAccent\capitaltilde{"0303}{02DC}
7087 \DeclareUTFEncodedAccent\={"0304}{02C9}
7088 \DeclareUTFEncodedAccent\capitalmacron{"0304}{02C9}
7089 \DeclareUTFEncodedAccent\textoverline{"0305}{203E}
7090 \DeclareUTFEncodedAccent\u{"0306}{02D8}
7091 \DeclareUTFEncodedAccent\capitalbreve{"0306}{02D8}
7092 \DeclareUTFEncodedAccent\{"0307}{02D9}
7093 \DeclareUTFEncodedAccent\capitaldotaccent{"0307}{02D9}
7094 \DeclareUTFEncodedAccent\{"0308}{00A8}
7095 \DeclareUTFEncodedAccent\capitaldieresis{"0308}{00A8}
7096 \DeclareUTFEncodedAccent\m{"0309}{0309}
7097 \DeclareUTFEncodedAccent\texthookabove{"0309}{0309}
7098 \DeclareUTFEncodedAccent\r{"030A}{02DA}

```

```

7099 \DeclareUTFEncodedAccent\capitalring{"030A"}{"02DA}
7100 \DeclareUTFEncodedAccent\H{"030B"}{"02DD}
7101 \DeclareUTFEncodedAccent\capitalhungarumlaut{"030B"}{"02DD}
7102 \DeclareUTFEncodedAccent\v{"030C"}{"02C7}
7103 \DeclareUTFEncodedAccent\capitalcaron{"030C"}{"02C7}
7104 \DeclareUTFEncodedAccent\textvbaraccent{"030D"}{"02C8}
7105 \DeclareUTFEncodedAccent\textdoublevbaraccent{"030E"}{"0022}
7106 \DeclareUTFEncodedAccent\U{"030E"}{"0022}
7107 \DeclareUTFEncodedAccent\textdoublegrave{"030F"}{"02F5}
7108 \DeclareUTFEncodedAccent\G{"030F"}{"02F5}
7109 \DeclareUTFEncodedAccent\textdotbreve{"0310"}{"0310}
7110 \DeclareUTFEncodedAccent\textroundcap{"0311"}{"0311}
7111 \DeclareUTFEncodedAccent\newtie{"0311"}{"0311}
7112 \DeclareUTFEncodedAccent\capitalnewtie{"0311"}{"0311}
7113 \DeclareUTFEncodedAccent\textturncommaabove{"0312"}{"02BB}
7114 \DeclareUTFEncodedAccent\textcommaabove{"0313"}{"02BC}
7115 \DeclareUTFEncodedAccent\textrevcommaabove{"0314"}{"02BD}
7116 \DeclareUTFEncodedAccent\overbridge{"0346"}{"0346}
7117 \DeclareUTFEncodedAccent\crtilde{"034A"}{"034A}
7118 \DeclareUTFEncodedAccent\dottedtilde{"034B"}{"034B}
7119 \DeclareUTFEncodedAccent\doubletilde{"034C"}{"034C}
7120 \DeclareUTFEncodedAccent\textrightarrowhead{"0350"}{"02C3}
7121 \DeclareUTFEncodedAccent\textlefthalfring{"0351"}{"02D3}
7122 \DeclareUTFEncodedAccent\textriighthalfring{"0357"}{"02D2}
7123 \DeclareUTFDoubleEncodedSymbol\textdoublebrevebelow{"035C"}{"035C}
7124 \DeclareUTFDoubleEncodedAccent\textdoublebreve{"035D"}{"035D}
7125 \DeclareUTFDoubleEncodedAccent\textdoublemacron{"035E"}{"035E}
7126 \DeclareUTFDoubleEncodedSymbol\textdoublemacronbelow{"035F"}{"035F}
7127 \DeclareUTFDoubleEncodedAccent\textdoubletilde{"0360"}{"0360}
7128 \DeclareUTFDoubleEncodedAccent\t{"0361"}{"0361}
7129 \DeclareUTFDoubleEncodedAccent\capitaltie{"0361"}{"0361}
7130 \DeclareUTFDoubleEncodedAccent\texttoptiebar{"0361"}{"0361}
7131 \DeclareUTFDoubleEncodedSymbol\sliding{"0362"}{"0362}
7132 \DeclareUTFFTIPACCommand\t
7133 \DeclareUTFFTIPACCommand\capitaltie
7134 \DeclareUTFFTIPACCommand\texttoptiebar
7135 \DeclareUTFFTIPACCommand\sliding
7136 \DeclareUTFEncodedAccent\texthighrise{"1DC4"}{"1DC4}
7137 \DeclareUTFEncodedAccent\textlowrise{"1DC5"}{"1DC5}
7138 \DeclareUTFEncodedAccent\textrisefall{"1DC8"}{"1DC8}
7139 \DeclareUTFEncodedAccent\textfallrise{"1DC9"}{"1DC9}
7140 \DeclareUTFEncodedAccent\textaoilig{"1DD5"}{"1DD5}
7141 \DeclareUTFCompositeSymbol\textundertie{H}{"1E2A}
7142 \DeclareUTFCompositeSymbol\textundertie{h}{"1E2B}
7143 \DeclareUTFEncodedAccents\textcircumgrave{"0302"}{"0301}
7144 \DeclareUTFSymbol\textFinv{"2132}
7145 \DeclareUTFSymbol\textaleph{"2135}
7146 \DeclareUTFSymbol\textbeth{"2136}
7147 \DeclareUTFSymbol\textgimel{"2137}
7148 \DeclareUTFSymbol\textdaleth{"2138}
7149 \DeclareUTFSymbol\textGame{"2141}
7150 \DeclareUTFCompositeCommand\tonebar{25}\tonebar{2}\tonebar{5}}
7151 \DeclareUTFCompositeCommand\tonebar{52}\tonebar{5}\tonebar{2}}
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7153 \DeclareUTFEncodedCircle\textcircled{"20DD"}{"25EF}
7154 \DeclareUTFCompositeSymbol\textcircled{0}{"24EA}
7155 \DeclareUTFCompositeSymbol\textcircled{1}{"2460}
7156 \DeclareUTFCompositeSymbol\textcircled{2}{"2461}
7157 \DeclareUTFCompositeSymbol\textcircled{3}{"2462}
7158 \DeclareUTFCompositeSymbol\textcircled{4}{"2463}
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7165 \DeclareUTFCompositeSymbol\textcircled{11}{"246A}

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7166 \DeclareUTFCompositeSymbol\textcircled{12}{"246B}
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7170 \DeclareUTFCompositeSymbol\textcircled{16}{"246F}
7171 \DeclareUTFCompositeSymbol\textcircled{17}{"2470}
7172 \DeclareUTFCompositeSymbol\textcircled{18}{"2471}
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7174 \DeclareUTFCompositeSymbol\textcircled{20}{"2473}
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7176 \DeclareUTFCompositeSymbol\textcircled{22}{"3252}
7177 \DeclareUTFCompositeSymbol\textcircled{23}{"3253}
7178 \DeclareUTFCompositeSymbol\textcircled{24}{"3254}
7179 \DeclareUTFCompositeSymbol\textcircled{25}{"3255}
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7181 \DeclareUTFCompositeSymbol\textcircled{27}{"3257}
7182 \DeclareUTFCompositeSymbol\textcircled{28}{"3258}
7183 \DeclareUTFCompositeSymbol\textcircled{29}{"3259}
7184 \DeclareUTFCompositeSymbol\textcircled{30}{"325A}
7185 \DeclareUTFCompositeSymbol\textcircled{31}{"325B}
7186 \DeclareUTFCompositeSymbol\textcircled{32}{"325C}
7187 \DeclareUTFCompositeSymbol\textcircled{33}{"325D}
7188 \DeclareUTFCompositeSymbol\textcircled{34}{"325E}
7189 \DeclareUTFCompositeSymbol\textcircled{35}{"325F}
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7198 \DeclareUTFCompositeSymbol\textcircled{44}{"32B9}
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7212 \DeclareUTFCompositeSymbol\textcircled{H}{"24BD}
7213 \DeclareUTFCompositeSymbol\textcircled{I}{"24BE}
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7237 \DeclareUTFCompositeSymbol\textcircled{g}{24D6}
7238 \DeclareUTFCompositeSymbol\textcircled{h}{24D7}
7239 \DeclareUTFCompositeSymbol\textcircled{i}{24D8}
7240 \DeclareUTFCompositeSymbol\textcircled{j}{24D9}
7241 \DeclareUTFCompositeSymbol\textcircled{k}{24DA}
7242 \DeclareUTFCompositeSymbol\textcircled{l}{24DB}
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7244 \DeclareUTFCompositeSymbol\textcircled{n}{24DD}
7245 \DeclareUTFCompositeSymbol\textcircled{o}{24DE}
7246 \DeclareUTFCompositeSymbol\textcircled{p}{24DF}
7247 \DeclareUTFCompositeSymbol\textcircled{q}{24E0}
7248 \DeclareUTFCompositeSymbol\textcircled{r}{24E1}
7249 \DeclareUTFCompositeSymbol\textcircled{s}{24E2}
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7252 \DeclareUTFCompositeSymbol\textcircled{v}{24E5}
7253 \DeclareUTFCompositeSymbol\textcircled{w}{24E6}
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7255 \DeclareUTFCompositeSymbol\textcircled{y}{24E8}
7256 \DeclareUTFCompositeSymbol\textcircled{z}{24E9}
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7260 \DeclareUTFCompositeSymbol\textsuperscript{r}{02B3}
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7263 \DeclareUTFCompositeSymbol\textsuperscript{\textinvscr}{02B6}
7264 \DeclareUTFCompositeSymbol\textsuperscript{w}{02B7}
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7266 \DeclareUTFCompositeSymbol\textsuperscript{\textbabygamma}{02E0}
7267 \DeclareUTFCompositeSymbol\textsuperscript{\textgammalatinsmall}{02E0}
7268 \DeclareUTFCompositeSymbol\textsuperscript{l}{02E1}
7269 \DeclareUTFCompositeSymbol\textsuperscript{s}{02E2}
7270 \DeclareUTFCompositeSymbol\textsuperscript{x}{02E3}
7271 \DeclareUTFCompositeSymbol\textsuperscript{\textrevglotstop}{02E4}
7272 \DeclareUTFCompositeSymbol\textsuperscript{\textrepsilon}{1D4C}
7273 \DeclareUTFCompositeSymbol\textsuperscript{cyrn}{1D78}
7274 \DeclareUTFCompositeSymbol\textsuperscript{\textbarsci}{1DA7}
7275 \DeclareUTFCompositeSymbol\textsuperscript{V}{2C7D}
7276 \DeclareUTFCompositeSymbol\textsuperscript{\textHbar}{A7F8}
7277 \DeclareUTFCompositeSymbol\textsuperscript{\textHslash}{A7F8}
7278 \DeclareUTFCompositeSymbol\textsuperscript{\oe}{A7F9}
7279 \DeclareUTFCompositeSymbol\textsubscript{h}{2095}
7280 \DeclareUTFCompositeSymbol\textsubscript{k}{2096}
7281 \DeclareUTFCompositeSymbol\textsubscript{l}{2097}
7282 \DeclareUTFCompositeSymbol\textsubscript{m}{2098}
7283 \DeclareUTFCompositeSymbol\textsubscript{n}{2099}
7284 \DeclareUTFCompositeSymbol\textsubscript{p}{209A}
7285 \DeclareUTFCompositeSymbol\textsubscript{s}{209B}
7286 \DeclareUTFCompositeSymbol\textsubscript{t}{209C}

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The following definitions are taken from `hyperref`'s `puenc.def`.

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7287 \DeclareUTFEncodedAccent\textinvbreve{0311}{0311}
7288 \DeclareUTFEncodedSymbol\textsubbreve{032E}{203F}
7289 \DeclareUTFSymbol\textHT{0009}
7290 \DeclareUTFSymbol\textLF{000A}
7291 \DeclareUTFSymbol\textCR{000D}
7292 \DeclareUTFSymbol\textnumbersign{0023}
7293 \DeclareUTFSymbol\textparenleft{0028}
7294 \DeclareUTFSymbol\textparenright{0029}
7295 \DeclareUTFSymbol\textMVPlus{002B}
7296 \DeclareUTFSymbol\textMVComma{002C}
7297 \DeclareUTFSymbol\textMVMinus{002D}

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7298 \DeclareUTFSymbol\textMVPeriod{"002E}
7299 \DeclareUTFSymbol\textMVDivision{"002F}
7300 \DeclareUTFSymbol\textMVZero{"0030}
7301 \DeclareUTFSymbol\textMVOne{"0031}
7302 \DeclareUTFSymbol\textMVTwo{"0032}
7303 \DeclareUTFSymbol\textMVThree{"0033}
7304 \DeclareUTFSymbol\textMVFour{"0034}
7305 \DeclareUTFSymbol\textMVFive{"0035}
7306 \DeclareUTFSymbol\textMVSix{"0036}
7307 \DeclareUTFSymbol\textMVSeven{"0037}
7308 \DeclareUTFSymbol\textMVEight{"0038}
7309 \DeclareUTFSymbol\textMVNine{"0039}
7310 \DeclareUTFSymbol\textMVAt{"0040}
7311 \DeclareUTFCompositeCommand\.\{i\}{i}
7312 \DeclareUTFCompositeCommand\.\{j\}{j}
7313 \DeclareUTFSymbol\textlnot{"00AC}
7314 \DeclareUTFSymbol\textplusminus{"00B1}
7315 \DeclareUTFSymbol\textcedilla{"00B8}
7316 \DeclareUTFSymbol\textmultiply{"00D7}
7317 \DeclareUTFSymbol\textThorn{"00DE}
7318 \DeclareUTFSymbol\textdivide{"00F7}
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7326 \DeclareUTFSymbol\textlongs{"017F}
7327 \DeclareUTFSymbol\texthausA{"0181}
7328 \DeclareUTFSymbol\texthausD{"018A}
7329 \DeclareUTFSymbol\textrevE{"018E}
7330 \DeclareUTFSymbol\texthausK{"0198}
7331 \DeclareUTFSymbol\textPUnrleg{"019E}
7332 \DeclareUTFSymbol\textinve{"01DD}
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7334 \DeclareUTFSymbol\textgslash{"01E5}
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7347 \DeclareUTFSymbol\textslashc{"023C}
7348 \DeclareUTFSymbol\textniepsilon{"025B}
7349 \DeclareUTFSymbol\textipagamma{"0263}
7350 \DeclareUTFSymbol\textniiota{"0269}
7351 \DeclareUTFSymbol\textniiota{"0278}
7352 \DeclareUTFSymbol\textniupsilon{"028A}
7353 \DeclareUTFSymbol\textring{"02DA}
7354 \DeclareUTFSymbol\texttilde{"02DC}
7355 \DeclareUTFSymbol\texthungarumlaut{"02DD}
7356 \DeclareUTFSymbol\textringlow{"02F3}
7357 \DeclareUTFSymbol\texttildelow{"02F7}
7358 \DeclareUTFCommand\textnewtie{\textinvbreve\ }
7359 \DeclareUTFCommand\textdotbelow{\d\ }
7360 \DeclareUTFSymbol\textmacronbelow{"02CD}
7361 \DeclareUTFCommand\texttie{\t\ }
7362 \DeclareUTFSymbol\textnumeralsigngreek{"0374}
7363 \DeclareUTFSymbol\textnumeralsignlowergreek{"0375}
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7367 \DeclareUTFCompositeSymbol\{\textIota}{038A}
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7369 \DeclareUTFCompositeSymbol\{\textUpsilon}{038E}
7370 \DeclareUTFCompositeSymbol\{\textOmega}{038F}
7371 \DeclareUTFCompositeSymbol\{\textIotadieresis}{0390}
7372 \DeclareUTFSymbol\textIotadieresis{03AA}
7373 \DeclareUTFCompositeSymbol\{\textIota}{03AA}
7374 \DeclareUTFCompositeSymbol\{\textUpsilon}{03AB}
7375 \DeclareUTFCompositeSymbol\{\textalpha}{03AC}
7376 \DeclareUTFCompositeSymbol\{\textepsilon}{03AD}
7377 \DeclareUTFCompositeSymbol\{\texteta}{03AE}
7378 \DeclareUTFCompositeSymbol\{\textiota}{03AF}
7379 \DeclareUTFCompositeSymbol\{\textupsilonacutec}{03B0}
7380 \DeclareUTFSymbol\textmugreek{03BC}
7381 \DeclareUTFSymbol\textvarsigma{0322}
7382 \DeclareUTFCompositeSymbol\{\textiota}{03CA}
7383 \DeclareUTFCompositeSymbol\{\textupsilon}{03CB}
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7387 \DeclareUTFCompositeSymbol\{\textomega}{03CE}
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7417 \DeclareUTFSymbol\CYRB{0411}
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7421 \DeclareUTFSymbol\CYRE{0415}
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7428 \DeclareUTFSymbol\CYRL{041B}
7429 \DeclareUTFSymbol\CYRM{041C}
7430 \DeclareUTFSymbol\CYRN{041D}
7431 \DeclareUTFSymbol\CYRO{041E}

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7462 \DeclareUTFSymbol\cyrm{"043C}
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7477 \DeclareUTFSymbol\cyr{ery}{"044B}
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7513 \DeclareUTFSymbol\CYRIOTBYUS{046C}
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7516 \DeclareUTFSymbol\cyrksi{046F}
7517 \DeclareUTFSymbol\CYRPSI{0470}
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7528 \DeclareUTFSymbol\cyromegarnd{047B}
7529 \DeclareUTFSymbol\CYROMEGATITLO{047C}
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7531 \DeclareUTFSymbol\CYROT{047E}
7532 \DeclareUTFSymbol\cyrot{047F}
7533 \DeclareUTFSymbol\CYRKOPPA{0480}
7534 \DeclareUTFSymbol\cyrkoppa{0481}
7535 \DeclareUTFSymbol\cyrthousands{0482}
7536 \DeclareUTFSymbol\CYRISHRTDSC{048A}
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7542 \DeclareUTFSymbol\CYRGUP{0490}
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7544 \DeclareUTFSymbol\CYRGHCRS{0492}
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7552 \DeclareUTFSymbol\cyrzdsc{0499}
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7554 \DeclareUTFSymbol\CYRKDSC{049A}
7555 \DeclareUTFSymbol\cyrkdsc{049B}
7556 \DeclareUTFSymbol\CYRKVCRS{049C}
7557 \DeclareUTFSymbol\cyrkvcrs{049D}
7558 \DeclareUTFSymbol\CYRKHCRS{049E}
7559 \DeclareUTFSymbol\cyrkhcrs{049F}
7560 \DeclareUTFSymbol\CYRKBEAK{04A0}
7561 \DeclareUTFSymbol\cyrkbeak{04A1}
7562 \DeclareUTFSymbol\CYRNDSC{04A2}
7563 \DeclareUTFSymbol\cyrndsc{04A3}
7564 \DeclareUTFSymbol\CYRNG{04A4}
7565 \DeclareUTFSymbol\cyrng{04A5}
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7580 \DeclareUTFSymbol\CYRHDSC{"04B2}
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7623 \DeclareUTFCompositeSymbol\U{\CYRZ}{04DE}
7624 \DeclareUTFCompositeSymbol\U{\cyrz}{04DF}
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7699 \DeclareUTFSymbol\textbarp{"1D7D}

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7703 \DeclareUTFSymbol\textPURhookoepsilon{"1D93}
7704 \DeclareUTFSymbol\textPURhookopeno{"1D97}
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7706 \DeclareUTFCompositeSymbol\textsubbreve{h}{"1E2B}
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7961 \DeclareUTFSymbol\textgg{"226B}
7962 \DeclareUTFCommand\textngg{\textlstrikethru\textgg}
7963 \DeclareUTFSymbol\textbetween{"226C}
7964 \DeclareUTFSymbol\textnless{"226E}
7965 \DeclareUTFSymbol\textngtr{"226F}
7966 \DeclareUTFSymbol\textnleq{"2270}
7967 \DeclareUTFSymbol\textngeq{"2271}

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7968 \DeclareUTFSymbol\textlessssim{"2272}
7969 \DeclareUTFSymbol\textgtrsim{"2273}
7970 \DeclareUTFSymbol\textnlessssim{"2274}
7971 \DeclareUTFSymbol\textngtrsim{"2275}
7972 \DeclareUTFSymbol\textlessgtr{"2276}
7973 \DeclareUTFSymbol\textgtrless{"2277}
7974 \DeclareUTFSymbol\textngtrless{"2278}
7975 \DeclareUTFSymbol\textnlessgtr{"2279}
7976 \DeclareUTFSymbol\textprec{"227A}
7977 \DeclareUTFSymbol\textsucc{"227B}
7978 \DeclareUTFSymbol\textpreccurlyeq{"227C}
7979 \DeclareUTFSymbol\textsuccurlyeq{"227D}
7980 \DeclareUTFSymbol\textprecsim{"227E}
7981 \DeclareUTFCommand\textnprecsim{\textlstrikethru\textprecsim}
7982 \DeclareUTFSymbol\textsuccsim{"227F}
7983 \DeclareUTFCommand\textnsuccsim{\textlstrikethru\textsuccsim}
7984 \DeclareUTFSymbol\textnprec{"2280}
7985 \DeclareUTFSymbol\textnsucc{"2281}
7986 \DeclareUTFSymbol\textsubset{"2282}
7987 \DeclareUTFSymbol\textsupset{"2283}
7988 \DeclareUTFSymbol\textnsubset{"2284}
7989 \DeclareUTFSymbol\textnsupset{"2285}
7990 \DeclareUTFSymbol\textsubseteq{"2286}
7991 \DeclareUTFSymbol\textsupseteq{"2287}
7992 \DeclareUTFSymbol\textnsubseteq{"2288}
7993 \DeclareUTFSymbol\textnsupseteq{"2289}
7994 \DeclareUTFSymbol\textsubsetneq{"228A}
7995 \DeclareUTFSymbol\textsupsetneq{"228B}
7996 \DeclareUTFSymbol\textcupdot{"228D}
7997 \DeclareUTFSymbol\textcupplus{"228E}
7998 \DeclareUTFSymbol\textsqsubset{"228F}
7999 \DeclareUTFCommand\textnqssubset{\textlstrikethru\textsqsubset}
8000 \DeclareUTFSymbol\textsqsupset{"2290}
8001 \DeclareUTFCommand\textnqsupset{\textlstrikethru\textsqsupset}
8002 \DeclareUTFSymbol\textsqsubseq{"2291}
8003 \DeclareUTFCommand\textnqssubseq{\textlstrikethru\textsqsubseq}
8004 \DeclareUTFSymbol\textsqsupseq{"2292}
8005 \DeclareUTFCommand\textnqsupseq{\textlstrikethru\textsqsupseq}
8006 \DeclareUTFSymbol\textsqcap{"2293}
8007 \DeclareUTFSymbol\textsqcup{"2294}
8008 \DeclareUTFSymbol\textoplus{"2295}
8009 \DeclareUTFSymbol\textominus{"2296}
8010 \DeclareUTFSymbol\textotimes{"2297}
8011 \DeclareUTFSymbol\textoslash{"2298}
8012 \DeclareUTFSymbol\textodot{"2299}
8013 \DeclareUTFSymbol\textcircledcirc{"229A}
8014 \DeclareUTFSymbol\textcircledast{"229B}
8015 \DeclareUTFSymbol\textcircleddash{"229D}
8016 \DeclareUTFSymbol\textboxplus{"229E}
8017 \DeclareUTFSymbol\textboxminus{"229F}
8018 \DeclareUTFSymbol\textboxtimes{"22A0}
8019 \DeclareUTFSymbol\textboxdot{"22A1}
8020 \DeclareUTFSymbol\textvdash{"22A2}
8021 \DeclareUTFSymbol\textdashv{"22A3}
8022 \DeclareUTFCommand\textndashv{\textlstrikethru\textdashv}
8023 \DeclareUTFSymbol\texttop{"22A4}
8024 \DeclareUTFCommand\textndownvdash{\textlstrikethru\texttop}
8025 \DeclareUTFSymbol\textbot{"22A5}
8026 \DeclareUTFCommand\textnupvdash{\textlstrikethru\textbot}
8027 \DeclareUTFSymbol\textvDash{"22A8}
8028 \DeclareUTFSymbol\textVdash{"22A9}
8029 \DeclareUTFSymbol\textVvdash{"22AA}
8030 \DeclareUTFCommand\textnVdash{\textlstrikethru\textVvdash}
8031 \DeclareUTFSymbol\textVDash{"22AB}
8032 \DeclareUTFSymbol\textnvDash{"22AC}
8033 \DeclareUTFSymbol\textnVdash{"22AD}
8034 \DeclareUTFSymbol\textnVdash{"22AE}

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8035 \DeclareUTFSymbol\textnVDash{"22AF}
8036 \DeclareUTFSymbol\textlhd{"22B2}
8037 \DeclareUTFSymbol\textrhd{"22B3}
8038 \DeclareUTFSymbol\textunlhd{"22B4}
8039 \DeclareUTFSymbol\textunrhd{"22B5}
8040 \DeclareUTFSymbol\textmultimapdotbothA{"22B6}
8041 \DeclareUTFSymbol\textmultimapdotbothB{"22B7}
8042 \DeclareUTFSymbol\textmultimap{"22B8}
8043 \DeclareUTFSymbol\textveebar{"22BB}
8044 \DeclareUTFSymbol\textbarwedge{"22BC}
8045 \DeclareUTFSymbol\textstar{"22C6}
8046 \DeclareUTFSymbol\textdivideontimes{"22C7}
8047 \DeclareUTFSymbol\textbowtie{"22C8}
8048 \DeclareUTFSymbol\textltimes{"22C9}
8049 \DeclareUTFSymbol\textrtimes{"22CA}
8050 \DeclareUTFSymbol\textleftthreetimes{"22CB}
8051 \DeclareUTFSymbol\textrightthreetimes{"22CC}
8052 \DeclareUTFSymbol\textbacksimeq{"22CD}
8053 \DeclareUTFCommand\textnbacksimeq{\textlstrikethru\textbacksimeq}
8054 \DeclareUTFSymbol\textcurlyvee{"22CE}
8055 \DeclareUTFSymbol\textcurlywedge{"22CF}
8056 \DeclareUTFSymbol\textSubset{"22D0}
8057 \DeclareUTFCommand\textnSubset{\textlstrikethru\textSubset}
8058 \DeclareUTFSymbol\textSupset{"22D1}
8059 \DeclareUTFCommand\textnSupset{\textlstrikethru\textSupset}
8060 \DeclareUTFSymbol\textCap{"22D2}
8061 \DeclareUTFSymbol\textCup{"22D3}
8062 \DeclareUTFSymbol\textpitchfork{"22D4}
8063 \DeclareUTFSymbol\textlessdot{"22D6}
8064 \DeclareUTFSymbol\textgtrdot{"22D7}
8065 \DeclareUTFSymbol\textlll{"22D8}
8066 \DeclareUTFSymbol\textggg{"22D9}
8067 \DeclareUTFSymbol\textlesseqgtr{"22DA}
8068 \DeclareUTFSymbol\textgtreqless{"22DB}
8069 \DeclareUTFSymbol\textcurlyeqprec{"22DE}
8070 \DeclareUTFCommand\textncurlyeqprec{\textlstrikethru\textcurlyeqprec}
8071 \DeclareUTFSymbol\textcurlyeqsucc{"22DF}
8072 \DeclareUTFCommand\textncurlyeqsucc{\textlstrikethru\textcurlyeqsucc}
8073 \DeclareUTFSymbol\textnpreccurlyeq{"22E0}
8074 \DeclareUTFSymbol\textnsuccurlyeq{"22E1}
8075 \DeclareUTFSymbol\textnqsubsetq{"22E2}
8076 \DeclareUTFSymbol\textnqsupsetq{"22E3}
8077 \DeclareUTFSymbol\textsqsubsetq{"22E4}
8078 \DeclareUTFSymbol\textsqsupsetq{"22E5}
8079 \DeclareUTFSymbol\textlnsim{"22E6}
8080 \DeclareUTFSymbol\textgnsim{"22E7}
8081 \DeclareUTFSymbol\textprecnsim{"22E8}
8082 \DeclareUTFSymbol\textsuccnsim{"22E9}
8083 \DeclareUTFSymbol\textntriangleleft{"22EA}
8084 \DeclareUTFSymbol\textntriangleright{"22EB}
8085 \DeclareUTFSymbol\textntrianglelefteq{"22EC}
8086 \DeclareUTFSymbol\textntrianglerighteq{"22ED}
8087 \DeclareUTFSymbol\textvdots{"22EE}
8088 \DeclareUTFSymbol\textcdots{"22EF}
8089 \DeclareUTFSymbol\textudots{"22F0}
8090 \DeclareUTFSymbol\textddots{"22F1}
8091 \DeclareUTFSymbol\textbarin{"22F6}
8092 \DeclareUTFSymbol\textdiameter{"2300}
8093 \DeclareUTFSymbol\textbackneg{"2310}
8094 \DeclareUTFSymbol\textwasylozenge{"2311}
8095 \DeclareUTFSymbol\textinvbackneg{"2319}
8096 \DeclareUTFSymbol\textclock{"231A}
8097 \DeclareUTFSymbol\textulcorner{"231C}
8098 \DeclareUTFSymbol\texturcorner{"231D}
8099 \DeclareUTFSymbol\textllcorner{"231E}
8100 \DeclareUTFSymbol\textlrcorner{"231F}
8101 \DeclareUTFSymbol\textfrown{"2322}

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8102 \DeclareUTFSymbol\textsmile{"2323}
8103 \DeclareUTFSymbol\textKeyboard{"2328}
8104 \DeclareUTFSymbol\textlangle{"2329}
8105 \DeclareUTFSymbol\textrangle{"232A}
8106 \DeclareUTFSymbol\textAPLinV{"2339}
8107 \DeclareUTFSymbol\textTumbler{"233C}
8108 \DeclareUTFSymbol\textstmaryrdbaro{"233D}
8109 \DeclareUTFSymbol\textnotslash{"233F}
8110 \DeclareUTFSymbol\textnotbackslash{"2340}
8111 \DeclareUTFSymbol\textboxbackslash{"2342}
8112 \DeclareUTFSymbol\textAPLleftarrowbox{"2347}
8113 \DeclareUTFSymbol\textAPLrightarrowbox{"2348}
8114 \DeclareUTFSymbol\textAPLuparrowbox{"2350}
8115 \DeclareUTFSymbol\textAPLdownarrowbox{"2357}
8116 \DeclareUTFSymbol\textAPLinput{"235E}
8117 \DeclareUTFSymbol\textRequest{"2370}
8118 \DeclareUTFSymbol\textBeam{"2393}
8119 \DeclareUTFSymbol\texthexagon{"2394}
8120 \DeclareUTFSymbol\textAPLbox{"2395}
8121 \DeclareUTFSymbol\textForwardToIndex{"23ED}
8122 \DeclareUTFSymbol\textRewindToIndex{"23EE}
8123 \DeclareUTFSymbol\textbbslash{"244A}
8124 \DeclareUTFSymbol\textCircledA{"24B6}
8125 \DeclareUTFSymbol\textCleaningF{"24BB}
8126 \DeclareUTFCommand\textCleaningFF{\b\textCleaningF}
8127 \DeclareUTFSymbol\textCleaningP{"24C5}
8128 \DeclareUTFCommand\textCleaningPP{\b\textCleaningP}
8129 \DeclareUTFSymbol\textCuttingLine{"2504}
8130 \DeclareUTFSymbol\textUParrow{"25B2}
8131 \DeclareUTFSymbol\textbigtriangleup{"25B3}
8132 \DeclareUTFSymbol\textForward{"25B6}
8133 \DeclareUTFSymbol\texttriangleright{"25B7}
8134 \DeclareUTFSymbol\textRHD{"25BA}
8135 \DeclareUTFSymbol\textDOWNarrow{"25BC}
8136 \DeclareUTFSymbol\textbigtriangledown{"25BD}
8137 \DeclareUTFSymbol\textRewind{"25C0}
8138 \DeclareUTFSymbol\texttriangleleft{"25C1}
8139 \DeclareUTFSymbol\textLHD{"25C4}
8140 \DeclareUTFSymbol\textdiamond{"25C7}
8141 \DeclareUTFSymbol\textlozenge{"25CA}
8142 \DeclareUTFSymbol\textLEFTCIRCLE{"25D6}
8143 \DeclareUTFSymbol\textRIGHTCIRCLE{"25D7}
8144 \DeclareUTFSymbol\textboxbar{"25EB}
8145 \DeclareUTFSymbol\textCloud{"2601}
8146 \DeclareUTFSymbol\textFiveStar{"2605}
8147 \DeclareUTFSymbol\textFiveStarOpen{"2606}
8148 \DeclareUTFSymbol\textPhone{"260E}
8149 \DeclareUTFSymbol\textboxempty{"2610}
8150 \DeclareUTFSymbol\textCheckedbox{"2611}
8151 \DeclareUTFSymbol\textCrossedbox{"2612}
8152 \DeclareUTFSymbol\textCoffeecup{"2615}
8153 \DeclareUTFSymbol\textHandCuffLeft{"261A}
8154 \DeclareUTFSymbol\textHandCuffRight{"261B}
8155 \DeclareUTFSymbol\textHandLeft{"261C}
8156 \DeclareUTFSymbol\textHandRight{"261E}
8157 \DeclareUTFSymbol\textRadioactivity{"2622}
8158 \DeclareUTFSymbol\textBiohazard{"2623}
8159 \DeclareUTFSymbol\textAnkh{"2625}
8160 \DeclareUTFSymbol\textYinYang{"262F}
8161 \DeclareUTFSymbol\textfrownie{"2639}
8162 \DeclareUTFSymbol\textsmiley{"263A}
8163 \DeclareUTFSymbol\textblacksmiley{"263B}
8164 \DeclareUTFSymbol\textsun{"263C}
8165 \DeclareUTFSymbol\textleftmoon{"263D}
8166 \DeclareUTFSymbol\textrightmoon{"263E}
8167 \DeclareUTFSymbol\textmercury{"263F}
8168 \DeclareUTFSymbol\textPUfemale{"2640}

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8169 \DeclareUTFSymbol\textearth{"2641}
8170 \DeclareUTFSymbol\textmale{"2642}
8171 \DeclareUTFSymbol\textjupiter{"2643}
8172 \DeclareUTFSymbol\textsaturn{"2644}
8173 \DeclareUTFSymbol\texturanus{"2645}
8174 \DeclareUTFSymbol\textneptune{"2646}
8175 \DeclareUTFSymbol\textpluto{"2647}
8176 \DeclareUTFSymbol\textaries{"2648}
8177 \DeclareUTFSymbol\texttaurus{"2649}
8178 \DeclareUTFSymbol\textgemini{"264A}
8179 \DeclareUTFSymbol\textcancer{"264B}
8180 \DeclareUTFSymbol\textleo{"264C}
8181 \DeclareUTFSymbol\textvirgo{"264D}
8182 \DeclareUTFSymbol\textlibra{"264E}
8183 \DeclareUTFSymbol\textscorpio{"264F}
8184 \DeclareUTFSymbol\textsagittarius{"2650}
8185 \DeclareUTFSymbol\textcapricornus{"2651}
8186 \DeclareUTFSymbol\textaquarius{"2652}
8187 \DeclareUTFSymbol\textpisces{"2653}
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8189 \DeclareUTFSymbol\textheartsuitwhite{"2661}
8190 \DeclareUTFSymbol\textdiamondsuitwhite{"2662}
8191 \DeclareUTFSymbol\textclubsuitblack{"2663}
8192 \DeclareUTFSymbol\textspadesuitwhite{"2664}
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8194 \DeclareUTFSymbol\textdiamondsuitblack{"2666}
8195 \DeclareUTFSymbol\textclubsuitwhite{"2667}
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8197 \DeclareUTFSymbol\texttwonotes{"266B}
8198 \DeclareUTFSymbol\textsixteenthnote{"266C}
8199 \DeclareUTFSymbol\textflat{"266D}
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8201 \DeclareUTFSymbol\textsharp{"266F}
8202 \DeclareUTFSymbol\textrecycle{"2672}
8203 \DeclareUTFSymbol\textWheelchair{"267F}
8204 \DeclareUTFSymbol\textFlag{"2691}
8205 \DeclareUTFSymbol\textMineSign{"2692}
8206 \DeclareUTFSymbol\textdsimilitary{"2694}
8207 \DeclareUTFSymbol\textdsmedical{"2695}
8208 \DeclareUTFSymbol\textdsjuridical{"2696}
8209 \DeclareUTFSymbol\textdschemical{"2697}
8210 \DeclareUTFSymbol\textdsbiological{"2698}
8211 \DeclareUTFSymbol\textdscommercial{"269A}
8212 \DeclareUTFSymbol\textmanstar{"269D}
8213 \DeclareUTFSymbol\textdanger{"26A0}
8214 \DeclareUTFSymbol\textFemaleFemale{"26A2}
8215 \DeclareUTFSymbol\textMaleMale{"26A3}
8216 \DeclareUTFSymbol\textFemaleMale{"26A4}
8217 \DeclareUTFSymbol\textHermaphrodite{"26A5}
8218 \DeclareUTFSymbol\textNeutral{"26AA}
8219 \DeclareUTFSymbol\textPUuncrfemale{"26B2}
8220 \DeclareUTFSymbol\texthexstar{"26B9}
8221 \DeclareUTFSymbol\textSoccerBall{"26BD}
8222 \DeclareUTFSymbol\textSunCloud{"26C5}
8223 \DeclareUTFSymbol\textRain{"26C6}
8224 \DeclareUTFSymbol\textnoway{"26D4}
8225 \DeclareUTFSymbol\textMountain{"26F0}
8226 \DeclareUTFSymbol\textTent{"26FA}
8227 \DeclareUTFSymbol\textScissorRightBrokenBottom{"2701}
8228 \DeclareUTFSymbol\textScissorRight{"2702}
8229 \DeclareUTFSymbol\textScissorRightBrokenTop{"2703}
8230 \DeclareUTFSymbol\textScissorHollowRight{"2704}
8231 \DeclareUTFSymbol\textPhoneHandset{"2706}
8232 \DeclareUTFSymbol\textTape{"2707}
8233 \DeclareUTFSymbol\textPlane{"2708}
8234 \DeclareUTFSymbol\textEnvelope{"2709}
8235 \DeclareUTFSymbol\textPeace{"270C}
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8236 \DeclareUTFSymbol\textWritingHand{"270D}
8237 \DeclareUTFSymbol\textPencilRightDown{"270E}
8238 \DeclareUTFSymbol\textPencilRight{"270F}
8239 \DeclareUTFSymbol\textPencilRightUp{"2710}
8240 \DeclareUTFSymbol\textNibRight{"2711}
8241 \DeclareUTFSymbol\textNibSolidRight{"2712}
8242 \DeclareUTFSymbol\textCheckmark{"2713}
8243 \DeclareUTFSymbol\textCheckmarkBold{"2714}
8244 \DeclareUTFSymbol\textXSolid{"2715}
8245 \DeclareUTFSymbol\textXSolidBold{"2716}
8246 \DeclareUTFSymbol\textXSolidBrush{"2717}
8247 \DeclareUTFSymbol\textPlusOutline{"2719}
8248 \DeclareUTFSymbol\textPlus{"271A}
8249 \DeclareUTFSymbol\textPlusThinCenterOpen{"271B}
8250 \DeclareUTFSymbol\textPlusCenterOpen{"271C}
8251 \DeclareUTFSymbol\textCross{"271D}
8252 \DeclareUTFSymbol\textCrossOpenShadow{"271E}
8253 \DeclareUTFSymbol\textCrossOutline{"271F}
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8255 \DeclareUTFSymbol\textDavidStar{"2721}
8256 \DeclareUTFSymbol\textFourAsterisk{"2722}
8257 \DeclareUTFSymbol\textJackStar{"2723}
8258 \DeclareUTFSymbol\textJackStarBold{"2724}
8259 \DeclareUTFSymbol\textClowerTips{"2725}
8260 \DeclareUTFSymbol\textFourStar{"2726}
8261 \DeclareUTFSymbol\textFourStarOpen{"2727}
8262 \DeclareUTFSymbol\textFiveStarOpenCircled{"272A}
8263 \DeclareUTFSymbol\textFiveStarCenterOpen{"272B}
8264 \DeclareUTFSymbol\textFiveStarOpenDotted{"272C}
8265 \DeclareUTFSymbol\textFiveStarOutline{"272D}
8266 \DeclareUTFSymbol\textFiveStarOutlineHeavy{"272E}
8267 \DeclareUTFSymbol\textFiveStarConvex{"272F}
8268 \DeclareUTFSymbol\textFiveStarShadow{"2730}
8269 \DeclareUTFSymbol\textAsteriskBold{"2731}
8270 \DeclareUTFSymbol\textAsteriskCenterOpen{"2732}
8271 \DeclareUTFSymbol\textEightStarTaper{"2734}
8272 \DeclareUTFSymbol\textEightStarConvex{"2735}
8273 \DeclareUTFSymbol\textSixStar{"2736}
8274 \DeclareUTFSymbol\textEightStar{"2737}
8275 \DeclareUTFSymbol\textEightStarBold{"2738}
8276 \DeclareUTFSymbol\textTwelveStar{"2739}
8277 \DeclareUTFSymbol\textSixteenStarLight{"273A}
8278 \DeclareUTFSymbol\textSixFlowerPetalRemoved{"273B}
8279 \DeclareUTFSymbol\textSixFlowerOpenCenter{"273C}
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8281 \DeclareUTFSymbol\textSixFlowerAlternate{"273E}
8282 \DeclareUTFSymbol\textFiveFlowerPetal{"273F}
8283 \DeclareUTFSymbol\textFiveFlowerOpen{"2740}
8284 \DeclareUTFSymbol\textEightFlowerPetal{"2741}
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8286 \DeclareUTFSymbol\textSixFlowerAltPetal{"2743}
8287 \DeclareUTFSymbol\textSnowflakeChevron{"2744}
8288 \DeclareUTFSymbol\textSnowflake{"2745}
8289 \DeclareUTFSymbol\textSnowflakeChevronBold{"2746}
8290 \DeclareUTFSymbol\textSparkle{"2747}
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8292 \DeclareUTFSymbol\textAsteriskRoundedEnds{"2749}
8293 \DeclareUTFSymbol\textEightFlowerPetalRemoved{"274A}
8294 \DeclareUTFSymbol\textEightAsterisk{"274B}
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8297 \DeclareUTFSymbol\textSquareTopRight{"2750}
8298 \DeclareUTFSymbol\textSquareCastShadowBottomRight{"2751}
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8301 \DeclareUTFSymbol\textRectangleThin{"2758}
8302 \DeclareUTFSymbol\textRectangle{"2759}
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8303 \DeclareUTFSymbol\textRectangleBold{"275A}
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8306 \DeclareUTFSymbol\textveedot{"27C7}
8307 \DeclareUTFSymbol\textwedgedot{"27D1}
8308 \DeclareUTFSymbol\textleftspoon{"27DC}
8309 \DeclareUTFSymbol\textlbrackdbl{"27E6}
8310 \DeclareUTFSymbol\textlbrackdbl{"27E7}
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8313 \DeclareUTFSymbol\textlongleftarrow{"27F5}
8314 \DeclareUTFSymbol\textlongrightarrow{"27F6}
8315 \DeclareUTFSymbol\textlongleftarrow{"27F7}
8316 \DeclareUTFSymbol\textLongleftarrow{"27F8}
8317 \DeclareUTFSymbol\textLongrightarrow{"27F9}
8318 \DeclareUTFSymbol\textLongleftarrow{"27FA}
8319 \DeclareUTFSymbol\textlongmapsto{"27FC}
8320 \DeclareUTFSymbol\textLongmapsfrom{"27FD}
8321 \DeclareUTFSymbol\textLongmapsto{"27FE}
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8324 \DeclareUTFSymbol\textlhooknearrow{"2923}
8325 \DeclareUTFSymbol\textrhooknearrow{"2924}
8326 \DeclareUTFSymbol\textlhooksearrow{"2925}
8327 \DeclareUTFSymbol\textrhookswarrow{"2926}
8328 \DeclareUTFSymbol\textleadsto{"2933}
8329 \DeclareUTFSymbol\textrcurvearrowne{"2934}
8330 \DeclareUTFSymbol\textlcurvearrowse{"2935}
8331 \DeclareUTFSymbol\textlcurvearrowsw{"2936}
8332 \DeclareUTFSymbol\textrcurvearrowse{"2937}
8333 \DeclareUTFSymbol\textlcurvearrowdown{"2938}
8334 \DeclareUTFSymbol\textrcurvearrowdown{"2939}
8335 \DeclareUTFSymbol\textrcurvearrowleft{"293A}
8336 \DeclareUTFSymbol\textrcurvearrowright{"293B}
8337 \DeclareUTFSymbol\textlefttrightharpoon{"294A}
8338 \DeclareUTFSymbol\textrightleftharpoon{"294B}
8339 \DeclareUTFSymbol\textupdownharpoonrightleft{"294C}
8340 \DeclareUTFSymbol\textupdownharpoonleftright{"294D}
8341 \DeclareUTFSymbol\textleftleftharpoons{"2962}
8342 \DeclareUTFSymbol\textupupharpoons{"2963}
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8344 \DeclareUTFSymbol\textdowndownharpoons{"2965}
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8352 \DeclareUTFSymbol\textrrparenthesis{"2988}
8353 \DeclareUTFSymbol\textinvdiameter{"29B0}
8354 \DeclareUTFSymbol\textobar{"29B6}
8355 \DeclareUTFSymbol\textobslash{"29B8}
8356 \DeclareUTFSymbol\textobot{"29BA}
8357 \DeclareUTFSymbol\textNoChemicalCleaning{"29BB}
8358 \DeclareUTFSymbol\textolessthan{"29C0}
8359 \DeclareUTFSymbol\textogreaterthan{"29C1}
8360 \DeclareUTFSymbol\textboxslash{"29C4}
8361 \DeclareUTFSymbol\textboxslash{"29C5}
8362 \DeclareUTFSymbol\textboxast{"29C6}
8363 \DeclareUTFSymbol\textboxcircle{"29C7}
8364 \DeclareUTFSymbol\textboxbox{"29C8}
8365 \DeclareUTFSymbol\textValve{"29D3}
8366 \DeclareUTFSymbol\textmultimapboth{"29DF}
8367 \DeclareUTFSymbol\textshuffle{"29E2}
8368 \DeclareUTFSymbol\textuplus{"2A04}
8369 \DeclareUTFSymbol\textbigdoublewedge{"2A07}

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8370 \DeclareUTFSymbol\textbigdoublevee{"2A08}
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8373 \DeclareUTFSymbol\textcircplus{"2A22}
8374 \DeclareUTFSymbol\textminusdot{"2A2A}
8375 \DeclareUTFSymbol\textdottimes{"2A30}
8376 \DeclareUTFSymbol\textdimes{"2A32}
8377 \DeclareUTFSymbol\textodiv{"2A38}
8378 \DeclareUTFSymbol\textinvneg{"2A3C}
8379 \DeclareUTFSymbol\textsqdoublecap{"2A4E}
8380 \DeclareUTFSymbol\textcapdot{"2A40}
8381 \DeclareUTFSymbol\textsqdoublecup{"2A4F}
8382 \DeclareUTFSymbol\textdoublewedge{"2A55}
8383 \DeclareUTFSymbol\textdoublevee{"2A56}
8384 \DeclareUTFSymbol\textdoublebarwedge{"2A5E}
8385 \DeclareUTFSymbol\textveedoublebar{"2A63}
8386 \DeclareUTFSymbol\texteqdot{"2A66}
8387 \DeclareUTFCommand\textneqdot{\textlstrikethru\texteqdot}
8388 \DeclareUTFSymbol\textcoloncolonequals{"2A74}
8389 \DeclareUTFSymbol\textleqslant{"2A7D}
8390 \DeclareUTFCommand\textnleqslant{\textlstrikethru\textleqslant}
8391 \DeclareUTFSymbol\textgeqslant{"2A7E}
8392 \DeclareUTFCommand\textngeqslant{\textlstrikethru\textgeqslant}
8393 \DeclareUTFSymbol\textlessapprox{"2A85}
8394 \DeclareUTFCommand\textnlessapprox{\textlstrikethru\textnlessapprox}
8395 \DeclareUTFSymbol\textgtrapprox{"2A86}
8396 \DeclareUTFCommand\textngtrapprox{\textlstrikethru\textgtrapprox}
8397 \DeclareUTFSymbol\textlneq{"2A87}
8398 \DeclareUTFSymbol\textgneq{"2A88}
8399 \DeclareUTFSymbol\textlnapprox{"2A89}
8400 \DeclareUTFSymbol\textgnapprox{"2A8A}
8401 \DeclareUTFSymbol\textlesseqqtr{"2A8B}
8402 \DeclareUTFSymbol\textgtreqqless{"2A8C}
8403 \DeclareUTFSymbol\texteqslantless{"2A95}
8404 \DeclareUTFSymbol\texteqslantgtr{"2A96}
8405 \DeclareUTFSymbol\textleftslice{"2AA6}
8406 \DeclareUTFSymbol\textrightslice{"2AA7}
8407 \DeclareUTFSymbol\textpreceq{"2AAF}
8408 \DeclareUTFCommand\textnpreceq{\textlstrikethru\textpreceq}
8409 \DeclareUTFSymbol\textsucceq{"2AB0}
8410 \DeclareUTFCommand\textnsucceq{\textlstrikethru\textsucceq}
8411 \DeclareUTFSymbol\textprecneq{"2AB1}
8412 \DeclareUTFSymbol\textsucneq{"2AB2}
8413 \DeclareUTFSymbol\textpreceqq{"2AB3}
8414 \DeclareUTFCommand\textnpreceqq{\textlstrikethru\textpreceqq}
8415 \DeclareUTFSymbol\textsucceqq{"2AB4}
8416 \DeclareUTFCommand\textnsucceqq{\textlstrikethru\textsucceqq}
8417 \DeclareUTFSymbol\textprecneqq{"2AB5}
8418 \DeclareUTFSymbol\textsucneqq{"2AB6}
8419 \DeclareUTFSymbol\textprecapprox{"2AB7}
8420 \DeclareUTFCommand\textnprecapprox{\textlstrikethru\textprecapprox}
8421 \DeclareUTFSymbol\textsuccapprox{"2AB8}
8422 \DeclareUTFCommand\textnsuccapprox{\textlstrikethru\textsuccapprox}
8423 \DeclareUTFSymbol\textprecnapprox{"2AB9}
8424 \DeclareUTFSymbol\textsuccnapprox{"2ABA}
8425 \DeclareUTFSymbol\textsubseteqq{"2AC5}
8426 \DeclareUTFCommand\textnsubseteqq{\textlstrikethru\textsubseteqq}
8427 \DeclareUTFSymbol\textsupseteqq{"2AC6}
8428 \DeclareUTFCommand\textnsupseteqq{\textlstrikethru\textsupseteqq}
8429 \DeclareUTFSymbol\textdashV{"2AE3}
8430 \DeclareUTFCommand\textndashV{\textlstrikethru\textdashV}
8431 \DeclareUTFSymbol\textDashv{"2AE4}
8432 \DeclareUTFCommand\textnDashv{\textlstrikethru\textDashv}
8433 \DeclareUTFSymbol\textDashV{"2AE5}
8434 \DeclareUTFCommand\textnDashV{\textlstrikethru\textDashV}
8435 \DeclareUTFSymbol\textdownmodels{"2AEA}
8436 \DeclareUTFCommand\textndownmodels{\textlstrikethru\textdownmodels}

```

```

8437 \DeclareUTFSymbol\textupmodels{"2AEB}
8438 \DeclareUTFCommand\textnupmodels{\textlstrikethru\textupmodels}
8439 \DeclareUTFSymbol\textupspoon{"2AEF}
8440 \DeclareUTFSymbol\textinterleave{"2AF4}
8441 \DeclareUTFSymbol\textsslash{"2AFD}
8442 \DeclareUTFSymbol\textpentagon{"2B20}
8443 \DeclareUTFSymbol\textvarhexagon{"2B21}
8444 \DeclareUTFSymbol\textjinferior{"2C7C}
8445 \DeclareUTFSymbol\textslashdiv{"2E13}
8446 \DeclareUTFSymbol\textinterrobangdown{"2E18}
8447 \DeclareUTFSymbol\textfivedots{"2E2D}
8448 \DeclareUTFSymbol\textPUheng{"A727}
8449 \DeclareUTFSymbol\textPULhookfour{"A72C}
8450 \DeclareUTFSymbol\textPUscf{"A730}
8451 \DeclareUTFSymbol\textPUaolig{"A735}
8452 \DeclareUTFSymbol\textoo{"A74F}
8453 \DeclareUTFSymbol\textcircumlow{"A788}
8454 \DeclareUTFSymbol\textfi{"FB01}
8455 \DeclareUTFSymbol\textfl{"FB02}
8456 \DeclareUTFSymbol\textGaPa{"1D13B}
8457 \DeclareUTFSymbol\textHaPa{"1D13C}
8458 \DeclareUTFSymbol\textViPa{"1D13D}
8459 \DeclareUTFSymbol\textAcPa{"1D13E}
8460 \DeclareUTFSymbol\textSePa{"1D13F}
8461 \DeclareUTFSymbol\textZwPa{"1D140}
8462 \DeclareUTFSymbol\textfullnote{"1D15D}
8463 \DeclareUTFSymbol\texthalfnote{"1D15E}
8464 \DeclareUTFSymbol\textVier{"1D15F}
8465 \DeclareUTFSymbol\textAcht{"1D160}
8466 \DeclareUTFSymbol\textSech{"1D161}
8467 \DeclareUTFSymbol\textZwdr{"1D162}
8468 \DeclareUTFSymbol\textMundus{"1F30D}
8469 \DeclareUTFSymbol\textMoon{"1F319}
8470 \DeclareUTFSymbol\textManFace{"1F468}
8471 \DeclareUTFSymbol\textWomanFace{"1F469}
8472 \DeclareUTFSymbol\textFax{"1F4E0}
8473 \DeclareUTFSymbol\textFire{"1F525}
8474 \DeclareUTFSymbol\textBicycle{"1F6B2}
8475 \DeclareUTFSymbol\textGentsroom{"1F6B9}
8476 \DeclareUTFSymbol\textLadiesroom{"1F6BA}
8477 \DeclareUTFCommand\textcopyleft{\textcircled\textrevc}
8478 \DeclareUTFCommand\textccsa{\textcircled\textcirclearrowleft}
8479 \DeclareUTFSymbol\textglqq{"201E}
8480 \DeclareUTFSymbol\textgrqq{"201C}
8481 \DeclareUTFSymbol\textglq{"201A}
8482 \DeclareUTFSymbol\textgrq{"2018}
8483 \DeclareUTFSymbol\textflqq{"00AB}
8484 \DeclareUTFSymbol\textfrqq{"00BB}
8485 \DeclareUTFSymbol\textflq{"2039}
8486 \DeclareUTFSymbol\textfrq{"203A}
8487 \DeclareUTFSymbol\textneg{"00AC}
8488 \DeclareUTFSymbol\textcdot{"00B7}

8489 </xunextra>

8490 <@@=xeCJK>

```

5.22 *xeCJK.cfg*

```
8491 <*config>
```

The preset configuration file *xeCJK.cfg* is an empty file. You can add settings in it, and then save it to the local directory.

```
8492
```

```
8493 </config>
```

Version History

v3.1.0 (2012/11/13 - 2012/11/21)

General: Waives special handling of `\outer` macros. 1

Abandon the use of font size reduction and use only spacing adjustment

The style is aligned with the Western equal-width font. And it is only applicable with transcription environment. 91

Change to `indentfirst` macro package to handle indentation. 98

Remove the external macro restriction of `\cprotect`. ... 107

Delete the redundant `default-itcorr` node. 38

Use the mechanism of the `xtemplate` macro package to organize the handling of punctuation. 62

LocalConfig: Add `LocalConfig` option for loading local configuration

File. 96

`\xeCJK@fix@penalty`: Use the method of `\/` without modifying the original language for

Fix tilt correction. 102

`\xeCJK_fallback_loop:nnNN`: Adjust the loop side of the alternate font.

style. 73

`\xeCJK_glyph_if_exist:N`: Improve the `fontspec` macro package defined in

`\font_glyph_if_exist:NnTF`. 20

`\xeCJK_hook_for_ulem::` Simplified compatibility patch for the `ulem` macro package. 108

`\c_xeCJK_space_skip_tl`: inter-word space consideration `\spaceskip` not

is a zero case. 20

`\xeCJK_switch_font:nn`: Improve the definition `\dpeek` up the switching speed. 81

`\xeCJKVerbAddon`: Add `\xeCJKVerbAddon` for transcription environment

The spacing adjustment in the..... 92

v3.1.1 (2012/12/02 - 2012/12/13)

General: No longer relies on the `xpatch` macro package... 1

Give error warnings for conflicts with `xltxtra`. 101

Add `NewLineCS` and `EnvCS` options. 57

Add small macro package `xeCJKfntef` to handle underlining. 108

CheckFullRight: Handles line breaks after `full-right` punctuation. 52

InlineEnv: changes the way the in-line environment is set up so that it can be used

`\str_case_x:nnnn` instead of `\clist_if_in:NnTF` to

Determine if it is an in-line environment. 57

PlainEquation: Add `PlainEquation` option. 56

`\xeCJK@family`: Modify the automatic update method of the main CJK font family. 101

`\xeCJK_check_single_aux:nNNw`: Improve the definition `\dpeek` reduce the number of times to use the `peek`

function. 55

`\xeCJK_check_single_space:NN`: `CheckSingle` Support

`Atuofu` paragraph, "Chinese character + Chinese character + space + Chinese character/punctuation" is

used. 56

`\xeCJK_hook_for_ulem::` fully handle punctuation in underscore

related issues. 108

`\xeCJK_peek_catcode_ignore_spaces:NTF`: Added with omission

The `peek` function marked by a space. 22

`\xeCJK_save_class:nn`: Use `\xeCJK_save_class:nn` to keep

Store the X_YTEX predefined character classes. 24

`\xeCJK_set_char_class:nnn`: When setting the character class in the document

No duplicate settings `\catcode`. 31

`\xeCJK_set_char_class_eq:nn`: Order of exchanging arguments. 31

`\xeCJK_set_verb_exspace::` the calculation method of adjusting spacing. 94

`\xeCJKnobreak`: Add the `xeCJK` version of `\nobreak`. 54

v3.1.2 (2012/12/27 - 2013/01/01)

General: Resolve error when using `\makebox` in underscore state. 113

Fix the `xunicode` redefinition under the non `\UTFencname` encoding

`\nobreakspace` will fail. 101

Fix the problem that redefinition `\CJKfamilydefault` is invalid and restore fault tolerance

Ability. 87

	are treated according to their <code>\catcode</code>	
	Distinguish between <code>letter</code> and <code>other</code>	127
<code>\xeCJK_restore_shipout_CJKsymbol::</code>	Solution	
<code>\CJKunderdot</code>	affects the header and footer when using across pages.	124
<code>\xeCJK_ulem_FullLeft_and_CJK::</code>	After fixing the full-left corner punctuation	
	The problem of abnormal result when <code>underline</code> is used with <code>\CJKunderdot</code>	117
<code>\xeCJKVerbAddon::</code>	Add <code>\xeCJKOffVerbAddon</code> to partially cancel the effect of <code>\xeCJKOffVerbAddon</code> ; and solve the problem of cross-page usage.	
	Issues affecting the header and footer.	92
v3.2.4	(2013/06/23 - 2013/07/06)	
General:	The <code>CJKnumber</code> option is no longer used and can be used directly after <code>xeCJK</code> .	
	Use <code>CJKnumb</code> macro package to get Chinese numbers.	108
	Improve the way to get partition font properties.	76
	Solve the problem that when using <code>CheckSingle</code> , some <code>\CJKglue</code> cannot be correctly	
	Accessions.	56
	Try to remove the <code>\kern</code> used as a judgment flag.	38
	How to set the internal adjustment partition font.	75
<code>\xeCJK@family:</code>	Do not fully expand the parameter.	101
<code>\xeCJK_check_single_space:NN:</code>	Use <code>\xeCJK_if_CJK_class:N</code> instead of <code>\int_case:nnn</code> judgment	
	If or not this is a CJK character class.	56
<code>\xeCJK_family_unknown_warning:n:</code>	In the absence of any defined	
	In the case of CJK fonts, the warning that the font is not defined is not repeated.	84
v3.2.0	(2013/04/14 - 2013/05/22)	
General:	Add IVS character class for handling variant character selectors.	24
	Add <code>Verb</code> option.	91
<code>\setCJKmonofont:</code>	Add <code>\normalfont</code> to the definition.	84
<code>\xeCJK_Boundary_and_FullLeft_glue:N:</code>	Compress when the nodes of <code>hlistnoneglue</code> and <code>penalty</code> are in front of the full-left marker.	
	Its left blank.	47
<code>_xeCJK_family_tl:</code>	do not initialize it to <code>\CJKfamilydefault</code>	83
<code>\xeCJK_FullLeft_and_Default::</code>	Fix <code>xeCJK</code> to make the western language in	
	The problem of not being able to break words in some cases.	46
<code>\c_xeCJK_space_skip_tl:</code>	spaces between words are taken into account	
	The case of <code>\spacefactor</code> and <code>\xspaceskip</code>	20
v3.2.1	(2013/05/29)	
General:	Adjusts the <code>Verb</code> option: when used in the command <code>\verb</code> , it does not break the	
	Punctuation ban then value added <code>env+</code>	91
v3.2.2	(2013/05/30 - 2013/06/04)	
General:	Fix the problem that some accents are not displayed correctly.	1
	Add small macro package <code>xeCJK-listings</code> to support <code>listings</code> macro package.	125
<code>\xeCJK_ulem_CJK_and_FullRight_glue:N:</code>	Fix underlining	
	The problem that the line can't skip the full-corner right punctuation.	116
v3.2.3	(2013/06/04 - 2013/06/11)	
General:	No longer change the <code>\catcode</code> of CJK character class.	
	Rearrange the full-angle punctuation according to X _Y TEX's script.	25
	Resolve conflicts between the <code>CheckSingle</code> option and the <code>tablists</code> macro package.	56
	Four TE _X kit mapping files are provided for period conversion and simple and traditional interchange.	1
	Improve support for <code>listings</code> macro packages.	125
<code>\xeCJK_listings_initial_hook::</code>	Solve the problem of incorrect code line number output in the bad context of <code>listings</code> , and solve the problem when spanning pages in it.	
	Impact on headers and footers.	126
<code>\xeCJK_listings_process_Default:nN:</code>	In <code>listings</code>	
	Characters with <code>\charcode</code> greater than 255 in the badlands	

Make the <code>breaklines</code> option of <code>listings</code> available to CJK character classes, and keep	
Forbidden rules for holding punctuation marks.	128
When using <code>AllowBreakBetweenPuncts</code> , the corresponding punctuation still works	
Align with the boundary.	45
Fix a conflict between <code>xeCJKfntef</code> and <code>natbib</code> , etc.	108
The principle that LATEX3 variables need to be declared in advance is followed.	1
<code>\addCJKfontfeatures</code> : you can add each partition font individually	
The properties of the	86
<code>CJKfilltwosides</code> : Switching to <code>minipage</code> and LATEX forms (<code>tabular</code>) to achieve.	125
<code>\xeCJK_Boundary_and_FullLeft_glue:N</code> : Refine the boundary with	
Judgment of whether the space is compressed between full-corner left punctuation.	47
<code>\xeCJK_fallback_loop:nnNN</code> : make <code>\CJKfamilydefault</code>	
The <code>FallBack</code> setting is globally available.	73
<code>\xeCJK_set_verb_exspace:</code> When the calculated spacing is negative	
When the CJK font is reduced, the CJK font is reduced. .	94
<code>\xeCJK_tl_remove_outer_braces:n: r e m o v e</code> outer grouping braces	
When removing spaces avoid dead loops.	19
<code>\xeCJK_token_value_charcode:N</code> : Consider <code>charcode</code> exceeded	
The case of BMP.	22
v3.2.5 (2013/07/10 - 2013/07/25)	
General: Restores the original definition of	
<code>\nobreakspace</code>	101
Resolve conflicts between <code>fixltx2e</code> and <code>amsthm</code>	101
Fix the problem caused by boundary between CJK and <code>NormalSpace</code> character classes.	
The spacing is not correct.	36
Add small macro package <code>xunicode-addon</code> to provide judgement words for <code>xunicode</code>	
The function of whether the symbol exists or not.	131
<code>\@setupverbvisiblespace</code> : Visual spaces consider traditional TEX fonts	
The situation.	95
<code>Verb</code> : Fine-tuning definition.	91
<code>\xeCJK_Boundary_and_FullLeft_glue:N</code> : Refine full-left corner	
Determine whether the punctuation is at the beginning of a paragraph.	47
Add judgment for <code>\item</code> modified by <code>enumitem</code> macro package.	47
<code>\xeCJK_math_robust:N</code> : Solve the problem that the Chinese character is immediately followed by <code>\(. \)</code> form	
Spacing cannot be added when the mathematical formula in the line of the formula.	100
<code>\xeCJKVerbAddon</code> : disable auto line feed consistent with western language.	92
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General: The <code>AutoFakeBold</code> and <code>AutoFakeSlant</code> options use the <code>fontspec</code> settings directly fixing the problem	
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The usage of <code>caseclass</code> functions is synchronized with LATEX3.	1
Reduce a possible family of math fonts for <code>\mathrm</code>	100
<code>\AtEndUTFCommand</code> : You can specify the hook to be used by a specific symbolic command.	141
<code>\xeCJK_CJK_and_Boundary:w</code> : A better way to handle the boundary is to <code>\relax</code>	
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<code>\xeCJK_math_robust:N</code> : Consider <code>ulem</code> 's	
Improperly defined.	100
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Question.	45
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- `\Url@MathSetup`: Enables the CJK characters set by `\UrlFont` and
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- The body takes effect. 99
- `\xeCJK_check_single_aux:nNNw`: compatible with `\CJKspace`. 55
- `\xeCJK_punct_glue:NN`: Stretch value of left/right margins of
punctuation marks
No more than the original boundary shrinkage value is not
less than the other side of the boundary. 45
- `\xeCJK_set_mathfont::` change the math categorization of CJK
characters from 7
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General: Enables circled numbers and letters in xunicode.
143
- `\DeclareUTFmathsymbols`: Fix the function of `\UseMathAsText`
The `\hbar` command can be used to restore the `\hbar` and add text
symbols starting with text. 133
- `\xeCJK_nobreak_skip::` disable line break in `\verb`. ... 92
- `\xeCJKVerbAddon`: Add the judgment of whether the font is
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- v3.2.9** (2013/12/07 - 2013/12/08)
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- `\DeclareEncodedCompositeAccents`: Fixed in xunicode
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Righteousness. 108
- `\DeclareUTFDoubleEncodedAccent`: Improve the definition
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- `\DeclareUTFTIPACCommand`: check the parameters of `\t` and `\sliding`
Starts with `\textipa` or not. 142
- `LoadFandol`: Uses the Fandol font family when no font is set. 87
- v3.2.11** (2014/03/14 - 2014/04/10)
General: Delete `\xeCJKcaption`. 107
- The left and right angle brackets U+2329 and U+232A are
Spanish punctuation marks. 25
- `\CJK@family`: Introduce `\CJK@family` to save the actual font
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- `indentfirst`: Drop `indentfirst` and `CJKnumber` options. 96
- `\xeCJK_add_to_shipout:n`: No longer use internal name. .. 19
- v3.2.12** (2014/05/12)
General: Update `\int_to_Hex:n`. 73
- Added RubberPunctSkip option. 60
- v3.2.13** (2014/06/02 - 2014/06/20)
General: `\Wm\CJKfamilydefault` is adjusted automatically, only
the
`\familydefault` Expand once. 87
- `\xeCJK_set_mathfont::` Fix the parameter type error. 89
- v3.2.14** (2014/10/31 - 2014/11/03)
General: `\xeCJKfntef` no longer depends on `CJKfntef`. 108
- Solve the problem that there is no `\CJKglue` or
`\CJKeclue` before and after the underscore. 108
- Refine the implementation of `\varCJKunderline`. 108
- v3.2.15** (2014/11/07 - 2014/11/10)
General: `\xeCJKfntef` Add hidden option. 108
- Put REVERSE SOLIDUS (U+005C) HYPHEN-MINUS
(U+002D) and EN DASH (U+2013) are classified as NormalSpace. 25
- Add HangulJamo character class. 25
- `\CJKunderanyline`: Refine the options. 120

<code>\xeCJK_listings_initial_hook::</code> Fix breaklines		X _{ETEX} 0.99994.	25
Invalid issue.	126	v3.4.0 (2016/05/01 - 2016/05/13)	
<code>\xeCJKfontefon:</code> Refine the options.	119	General: RubberPunctSkip option has new values plus and minus. 60	CJKmath function also supports partitioned fonts. 89
v3.2.16 (2014/11/20 - 2014/12/16)		The amount of compression of punctuation marks can stretch to the original margin and can shrink to smaller edges	
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Organize some code of <code>\xeCJKecglue</code>	39	<code>\xeCJK_set_mathfont::</code> The character range of CJKmath follows	
v3.3.0 (2014/12/26)		The setting of <code>\xeCJKDeclareCharClass</code>	89
General: Do not include some forbidden Japanese in the NS class		v3.4.1 (2016/05/21 - 2016/08/18)	
FullRight class.	26	General: Complement Unicode 9.0.0 for Xixia.	27
Lowercase Japanese kana is not included in the FullRight class.	27		
<code>\xeCJK_PR_chars_clist:</code> Do not classify U+20A9 as CJK's PR class.	26		
v3.3.1 (2015/01/22 - 2015/05/08)			
General: IVS character class renamed to CM	24		
Remove <code>fixltx2e</code> and <code>amsthm</code> conflict patches.	101		
New option WidowPenalty	54		
<code>\CJKaddEncHook:</code> Apply the new original language <code>\Ucharcat</code> from version 0.99992.	108		
<code>LoadFandol:</code> For MacTeX users, Fandol fonts have been converted to files			
Name.	87		
<code>\xeCJK_check_single_cs:NNn:</code> Add spaces that may be missed.	56		
<code>\xeCJK_CM_chars_clist:</code> Complementary tone symbols.	30		
<code>\xeCJK_listings_initial_hook::</code> Solve the problem that <code>prebreak</code> and <code>postbreak</code> functions are disabled.	126		
<code>\xeCJK_listings_process_Default:nN:</code> The listings of Character expansion does not affect the seven or eight characters in its symbol table.	127		
<code>\xeCJK_math_robust:N:</code> LATEX 2 _ε 2015 compatible.	100		
<code>\xeCJK_token_value_charcode:N:</code> Version 0.99992 fixes <code>\meaning's</code> bug.	22		
<code>\gxeCJK_xetex_allocator_int:</code> Compatible with LATEX 2 _ε 2015.	103		
v3.3.2 (2015/05/15)			
General: Update Simplified and Traditional Chinese character mapping with Unicode 7.0.0.	1		
<code>\gxeCJK_xetex_allocator_int:</code>			
<code>\xe@alloc@intercharclass</code> is always defined.	103		
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