xeCJK Macro Package

CTEX.ORG

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Catalog

Section 1 Introduction

xeCJK is an XƎLATEX 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 XƎTEX and requires XƎTEX 0.9995.0 (2009/06/29) or later. xeCJK relies on the LATEX3 project's l3kernel and l3packages. xeCJK relies on the LATEX3 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 Li[2] 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 XƎLATEX.

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 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 ⋆ 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 mktexlsr 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 XƎTEX, 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 ⋆ 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 = ⟨true|false⟩

New: 2012-12-06 If you are using the $$... $$ 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 \[... \] to enter interlinear math formulas.

NewLineCS NewLineCS = { \par \ [}
NewLineCS+
NewLineCS-

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

New: 2012-12-04

EnvCS EnvCS = { \begin \end }
EnvCS+
EnvCS-

Set the control sequence for the start and end of the LATEX environment so that the CheckSingle option can be recognized correctly. The above is xeCJK
The initial settings of 2012-12-04.

InlineEnv InlineEnv = {⟨env1⟩, ⟨env2⟩, ⟨env3⟩, ...}
InlineEnv+
InlineEnv-

When using the CheckSingle option xeCJK will start the LATEX environment after the CJK text \begin{...}

Updated: 2012-12-06 and end \end{...} is considered a line break, if there are some special LATEX environments that do not cause line breaks, you can use this
The CheckSingle option is used to declare it so that CheckSingle will recognize it correctly.

AutoFallBack AutoFallBack = ⟨true|false⟩

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 = {⟨true|false|number⟩}

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 = {⟨true|false|number⟩}

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 = {⟨number|4⟩}

Set the default thickness of the pseudo-bold.

SlantFactor * SlantFactor = {⟨Number|0.167⟩}

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

PunctStyle PunctStyle = {⟨quanjiao|banjiao|kaiming|hangmobanjiao|CCT|plain|...⟩}

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.

CCT CCT 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+ ⋆
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+ ⋆
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+ ⋆
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

New: 2012-12-02 There are 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
Updated: 2016-11-18 \setCJKmainfont [⟨*font* features⟩] {⟨*font* name⟩}

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, and 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
Updated: 2016-11-18 \setCJKsansfont [⟨*font* features⟩] {⟨*font* name⟩}

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

\setCJKmonofont ⋆ \setCJKmonofont {⟨*font* name⟩}[⟨*font* features⟩] or
Updated: 2016-11-18 \setCJKmonofont [⟨*font* features⟩] {⟨*font* name⟩}

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

\setCJKfamilyfont ⋆ \setCJKfamilyfont {⟨family⟩} {⟨*font* name⟩}[⟨*font* features⟩] or
Updated: 2016-11-18 \setCJKfamilyfont {⟨family⟩} [⟨*font* features⟩] {⟨*font* name⟩}

Declare the new CJK font family ⟨family⟩ and specify the font.

\CJKfamily \CJKfamily {⟨family⟩}
Updated: 2012-10-27 \CJKfamily + {⟨family⟩}
\CJKfamily - {⟨family⟩}

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 Updated: 2016-11-18

\CJKfontspec {⟨font name⟩}[⟨font features⟩] or
\CJKfontspec [⟨font features⟩] {⟨font name⟩}

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 Updated: 2013-06-30

\addCJKfontfeatures {⟨font features⟩}
\addCJKfontfeatures * {⟨font features⟩}
\addCJKfontfeatures [⟨block$_1$, block$_2$, ...⟩] {⟨font features⟩}
\addCJKfontfeatures * [⟨block$_1$, block$_2$, ...⟩] {⟨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.

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

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

\CJKfamilydefault Updated:2013-01-01

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

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 * Updated: 2016-11-18

\setCJKmathfont {⟨font name⟩}[⟨font features⟩] or
\setCJKmathfont [⟨font features⟩] {⟨font name⟩}

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

font in mathematical formula.

\setCJKfallbackfamilyfont ⋆ \setCJKfallbackfamilyfont {⟨family⟩} {⟨font name⟩}[⟨font features⟩] or
\setCJKfallbackfamilyfont {⟨family⟩} [⟨font features⟩] {⟨font name⟩}
Updated: 2016-11-18

Set alternate fonts for the CJK font family ⟨family⟩. For example, using

Example 8

```
\setCJKmainfont{SimSun}
\setCJKfallbackfamilyfont{\CJKrmdefault}{SimSun-ExtB}
```

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

FallBack FallBack = {[⟨font features⟩]{⟨font name⟩}}

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

Example 9

```
\setCJKmainfont[FallBack=SimSun-ExtB]{SimSun}
```

to

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

Example 10

```
\setCJKmainfont[FallBack,AutoFakeBold,Scale=.97]{SimSun-ExtB}
```

Equivalent to

Example 11

```
\setCJKfallbackfamilyfont{\CJKrmdefault}[AutoFakeBold,Scale=.97]{SimSun-ExtB}
```

\setCJKfallbackfamilyfont ⋆ \setCJKfallbackfamilyfont {⟨family⟩}
Updated: 2013-06-30

```
{
  {[⟨font features 1⟩] {⟨font name 1⟩}} ,
  {[⟨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

Example 12

```
\setCJKmainfont[AutoFakeBold,AutoFakeSlant]{KaiTi_GB2312}
\setCJKfallbackfamilyfont{\CJKrmdefault}[AutoFakeSlant]
  { [BoldFont=SimHei]{SimSun} ,
    [AutoFakeBold]    {SimSun-ExtB} }
```

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 XETEX font name search

Since the fontspec macro package documentation lacks instructions on how to view the available font names for XETEX, here is a brief explanation. XETEX 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,Dőlt,Corsivo,Cursief,kursywa,Itálico,Курсив, İtalik,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, Félkövér dőlt, Grassetto Corsivo,
  Vet Cursief, Halvfet Kursiv, Pogrubiona kursywa, Negrito Itálico,
  Полужирный К урсив,Tučná kurzíva,Fet Kursiv,Kalın İtalik,
  Krepko poševno,nghiêng đậm,Lodi etzana
Times New Roman:style=Negreta,tučné,fed,Fett,Έντονα,Bold,Negrita,
  Lihavoitu,Gras,Félkövér,Grassetto,Vet,Halvfet, Pogrubiona,Negrito,
  Полужирный,Fet,Kalın,Krepko,đậm,Lodia
Times New Roman:style=Normal,obyčejné,Standard,Κανονικά,Regular,
  Normaali,Normál,Normale,Standaard,Normalny,Обычный,Normálne,Navadno,
  thường,Arrunta
Song,SimSun:style=Regular
bold,SimHei:style=Normal,obyčejné,Standard,Κανονικά,Regular,Normaali,
  Normál,Normale,Standaard,Normalny,Обычный,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

Example 13

```
\setmainfont{Times New Roman}
\setCJKmainfont{SimSun} % or \setCJKmainfont{宋体}
```

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 LuaTeXCJK macro package may not be able to access correctly by the font name, then you can also use this way to set them.

[3]Due 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 ⟨block range⟩ is a list of commas, which can be the Unicode range of CJK characters, or a single character Unicode. e.g.

Example 14

```
{ `Chinese -> `Wen , "3400 ->"4DBF , "5000 ->"7000 , `Han , `character , "3500 }
```

form. Note that the ⟨block range⟩ 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 range preset in the source code. Use

Example 15

```
\xeCJKDeclareSubCJKBlock{SPUA}{ "E400 -> "E4DA , "E500 -> "E5E8 , "E600 -> "E6CE }
\xeCJKDeclareSubCJKBlock{Ext-B}{ "20000 - > "2A6DF }
```

The two sub-partitions SPUA and Ext-B are declared. Meanwhile, in the ⟨font features⟩ 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

Example 16

```
\setCJKmainfont[SPUA=SunmanPUA,Ext-B=SimSun-ExtB]{SimSun}
```

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 ⟨block⟩ option set, the ⟨block⟩ option of \CJKfamilydefault will be used as the ⟨block⟩ option of that CJK font family. ⟨block⟩ option for that CJK font family. If you want to use a certain CJK font family without switching fonts between CJK main partition and ⟨block⟩, you can use the ⟨block⟩=* option. The command with an asterisk resets the character class to which the punctuation marks belong in addition to setting the CJK sub-partition.

\xeCJKCancelSubCJKBlock \xeCJKCancelSubCJKBlock {⟨block$_1$, block$_2$, ...⟩}
\xeCJKCancelSubCJKBlock {⟨block$_1$, block$_2$, ...⟩}

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

\xeCJKRestoreSubCJKBlock \xeCJKRestoreSubCJKBlock {⟨block$_1$, block$_2$, ...⟩}
\xeCJKRestoreSubCJKBlock * {⟨block$_1$, block$_2$, ...⟩}

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 /,\, and - (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⟩}
Updated: 2013-08-22 \xeCJKsetwidth * {punctuation list⟩} {⟨length⟩}

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 and back 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

Exampl

```
\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

Exampl e 20

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

will make the settings of \xeCJKsetkern etc. invalid for the format hangmobanjiao.

3.6 xeCJKfntef Usage Notes

xeCJK contains a sub-macro package xeCJKfntef, which can be used to implement Hard and line breakable underscore, etc. It is the replacement version of CJKfntef macro package under XƎLATEX, 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.

\CJKunderline
\CJKunderdblline
\CJKunderwave
\CJKsout
\CJKxout

Updated: 2014-11-04

\CJKunderline [*] [-] [⟨Options⟩] {⟨Content⟩}

```
\CJKunderline{Void Room, White, Auspicious Stop}\\\
\CJKunderdblline{Virtual Room to produce white, auspicious stop}\\\
\CJKunderwave{Void Room, White, Auspicious Stop}\\\
\CJKsout{Virtual room is white, auspicious stop}\\\
```

```
\CJKunderline-{Southern Dynasty}\CJKunderline-{Liang}\CJKunderline-{Liu Fu}%
\CJKunderwave-{Wenxin Diao Long}\CJKunderwave-{Nurturing Qi}\\
\CJKunderline*[thickness=1pt, hidden=true]{Looking at his section, the empty room is white,
```

Southern Liang Dynasty Liu Xin Diao Long

\CJKunderdot

Updated: 2014-11-04

\CJKunderdot [⟨Options⟩] {⟨Content⟩}

Adding dots under Chinese characters can be used in nesting with the underline command above. For example

```
\CJKunderline{Virtual Room for White,\CJKunderdot{Occidental}Stop}\\
```

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

New: 2014-11-04

```
\xeCJKsetup { underline/skip = ⟨true|false⟩ }
\xeCJKsetup { underline = { skip = ⟨true|false⟩ , ... } }
```

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.

format

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

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

textformat

New: 2016-06-031

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

```
\CJKunderline[textformat=\color{blue}]{Void room is white, auspicious stop}\\\
\CJKunderdot[textformat=\bfseries, format=\color{red}]{Virtual room to produce white,
```

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.

```
% \usepackage{fix-cm}
\xeCJKsetup{%
  underwave/symbol=
    \fontsize{0.5em}{0pt}%
```

The one who looks at the section of the song, white room is born, auspicious stop 4

5

6

7

8

thickness 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 0pt.

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

```
\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.

```
\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.

```
\CJKunderanysymbol[sep=0.1em]{0.2em}{\tiny$\triangle$}
  {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, need to be set in \xeCJKsetup by the object ulem. For example

```
\xeCJKsetup{ulem={textformat=\bfseries\color{red}, skip=true}}
\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 Updated: 2014-11-04

\begin{CJKfilltwosides} [⟨position⟩] {⟨width⟩}
text content\\
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

```
\begin{CJKfilltwosides}{.8\linewidth}
  The one who looks at his section, \\\
  The white of the virtual room is born,
  auspicious stop
```

view he The one who is shut
The room of emptiness is white, auspicious stop

```
\begin{CJKfilltwosides*}{0pt}
  The one who looks at his section, \\\
  The white of the virtual room is born,
  auspicious stop
```

view he the section of the
White in the virtual room, auspicious stop

3.7 Other

\xeCJKVerbAddon
\xeCJKOffVerbAddon
CJK Updated: 2012-11-16.

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 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 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), then \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 New: 2012-12-03

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

\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 New: 2013-11-09

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

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 LATEX3 syntax. LATEX3 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 XƎTEX, 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 XƎTEX 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.

```
21 \RequirePackage { ctexhook }
```

\xeCJK_if_package_loaded_p:n
\xeCJK_if_package_loaded:*nTF*

Determine if macro package has been introduced or not, can be used in the body of the document.

```
\prg_new_conditional:Npnn \xeCJK_if_package_loaded:n #1 { p , T , F , TF }
  {
    \tl_if_exist:cTF { ver@ #1 . \c xeCJK_package_ext_tl }
      { \prg_return_true: } { \prg_return_false: }
  }
\tl_const:Nx \c xeCJK_package_ext_tl { \@pkgextension }
```

The following CJK series macro packages should not be used.

```
\msg_new:nnn { xeCJK } { after-package }
  {
    The~`#1'~package~and~xeCJK~are~incompatible. \\\\
    Please~load~it~after~xeCJK.
  }
\clist_map_inline:nn { CJKnumb }
  {
    \xeCJK_if_package_loaded:nT {#1}
      { \msg_error:nnn { xeCJK } { after-package } {#1} }
  }
\clist_map_inline:nn
  { CJKulem , CJKvert , CJKpunct , CJKutf8 , CJK }
  { \ctex_disable_package:n {#1} }
```

Replace the CJKfntef package with the xeCJKfntef package.

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

\cs_if_exist:NF \NewDocumentCommand
  { \RequirePackage { xparse } }
\RequirePackage { xtemplate }
```

5.2 Internal Tools

Assign temporary variables.

```
\tl_new:N \l xeCJK_tmp_tl
\int_new:N \l xeCJK_tmp_int
\box_new:N \l xeCJK_tmp_box
\dim_new:N \l xeCJK_tmp_dim
\bool_new:N \l xeCJK_tmp_bool
\skip_new:N \l xeCJK_tmp_skip
\clist_new:N \l xeCJK_tmp_clist
```

\xeCJK_msg_new:nn
\xeCJK_error:n
\xeCJK_error:nx
\xeCJK_warning:nx
\xeCJK_info:nxx

Abbreviated form of various message functions.

```
\cs_new_protected:Npn \xeCJK_msg_new:nn      { \msg_new:nn      { xeCJK } }
\cs_new_protected:Npn \xeCJK_msg_new:nnn     { \msg_new:nnn     { xeCJK } }
\cs_new_protected:Npn \xeCJK_error:n         { \msg_error:nn    { xeCJK } }
\cs_new_protected:Npn \xeCJK_error:nx        { \msg_error:nnx   { xeCJK } }
\cs_new_protected:Npn \xeCJK_warning:n       { \msg_warning:nn  { xeCJK } }
\cs_new_protected:Npn \xeCJK_warning:nx      { \msg_warning:nnx { xeCJK } }
\cs_new_protected:Npn \xeCJK_warning:nxx     { \msg_warning:nnxx { xeCJK } }
\cs_new_protected:Npn \xeCJK_warning:nxxx    { \msg_warning:nnxxx { xeCJK } }
\cs_new_protected:Npn \xeCJK_info:nxx        { \msg_info:nnxx   { xeCJK } }
```

\xeCJK_allow_break:
\xeCJK_no_break:

```
\cs_new_protected:Npn \xeCJK_allow_break:
  { \tex_penalty:D \c_zero_int }
\cs_new_protected:Npn \xeCJK_no_break:
  { \tex_penalty:D \c xeCJK_nobreak_penalty_int }
\int_const:Nn \c xeCJK_nobreak_penalty_int { 10 000 }
```

\xeCJK_at_end_preamble:n
\xeCJK_after_preamble:n
\xeCJK_after_end_preamble:n
\xeCJK_package_hook:nn

Add various hooks before and after \document and after macro package, depending on ctexhook.

```
\AtBeginDocument                { \xeCJK@document@hook }
\ctex_at_end_preamble:          n{ \xeCJK@document@left@hook }
\ctex_after_end_preamble:n { \xeCJK@document@right@hook }
\cs_new_protected:Npn \xeCJK@document@hook
  { \tl_use:N \g xeCJK_after_preamble_hook_tl }
\cs_new_protected:Npn \xeCJK@document@left@hook
  { \tl_use:N \g xeCJK_at_end_preamble_hook_tl }
\cs_new_protected:Npn \xeCJK@document@right@hook
  { \tl_use:N \g xeCJK_after_end_preamble_hook_tl }
\cs_new_protected:Npn \ xeCJK_at_end_preamble:n
  { \tl_gput_right:Nn \g xeCJK_at_end_preamble_hook_tl }
\cs_new_protected:Npn \ xeCJK_after_preamble:n
  { \tl_gput_right:Nn \g xeCJK_after_preamble_hook_tl }
\cs_new_protected:Npn \ xeCJK_after_end_preamble:n
  { \tl_gput_right:Nn \g xeCJK_after_end_preamble_hook_tl }
\cs_new_protected:Npn \ xeCJK_package_hook:nn
  { \ctex_at_end_package:nn }
\tl_new:N \g xeCJK_at_end_preamble_hook_tl
\tl_new:N \g xeCJK_after_preamble_hook_tl
\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.

```
\ xeCJK_after_preamble:n
  { \tl_put_right:Nn \@begindvi { \xeCJK@first@begindvi } }
\cs_new_protected:Npn \xeCJK@first@begindvi
  {
    \xeCJKShipoutHook
    \cs_if_exist:NTF \@begindvi
      { \tl_gput_right:Nn }
      { \tl_const:Nn }
    \@begindvi { \xeCJKShipoutHook }
  }
\NewDocumentCommand \xeCJKShipoutHook { }
  {
    \bool_if:NF \l xeCJK_shipout_hook_bool
      {
        \bool_set_true:N \l xeCJK_shipout_hook_bool
        \tl_use:N \l xeCJK_shipout_hook_tl
      }
  }
```

\xeCJK_add_to_shipout:n 往 \shipout box add hook.

```
\cs_new_protected:Npn \xeCJK_add_to_shipout:n
  { \tl_put_right:Nn \l xeCJK_shipout_hook_tl }
\tl_new:N \l xeCJK_shipout_hook_tl
\bool_new:N \l xeCJK_shipout_hook_bool
```

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

```
\cs_new:Npn \xeCJK_tl_remove_outer_braces:n #1
  {
    \exp_last_unbraced:Ne
    \ xeCJK_tl_remove_outer_braces:w { \tl_trim_spaces:n {#1} } \s_stop
  }
\cs_new:Npn \ xeCJK_tl_remove_outer_braces:w #1 \s_stop
  {
    \tl_if_single:nTF {#1}
      {
        \tl_if_head_is_N_type:nTF {#1}
          { \tl_trim_spaces:n }
```

```
            { \xeCJK_tl_remove_outer_braces:n }
        }
        { \tl_trim_spaces:n }
        {#1}
    }
```

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

```
\cs_new_protected:Npn \xeCJK_cs_clear:N #1
    { \cs_set_eq:NN #1 \prg_do_nothing: }
\cs_new_protected:Npn \xeCJK_cs_gclear:N #1
    { \cs_gset_eq:NN #1 \prg_do_nothing: }
```

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

```
\cs_new_protected:Npn \xeCJK_swap_cs:NN #1#2
    {
      \cs_set_eq:NN \ xeCJK_swap_cs_aux:w #1
      \cs_set_eq:NN #1 #2
      \cs_set_eq:NN #2 \ xeCJK_swap_cs_aux:w
      \cs_undefine:N \ xeCJK_swap_cs_aux:w
    }
```

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

```
\cs_new_protected:Npn \xeCJK_font_gset_to_current:N
    { \exp_after:wN \ xeCJK_font_gset_to_current_aux:NN \tex_the:D \tex_font:D }
\cs_new_protected:Npn \ xeCJK_font_gset_to_current_aux:NN #1#2
    { \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: that causes unnecessary bounds and is also not fully scalable. Therefore, we redefine it.

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

\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.

```
\tl_const:Nn \c_xeCJK_space_skip_tl
    {
      \int_compare:nNnTF \g xeCJK_space_factor_int = { 1000 }
        {
          \skip_if_eq:nnTF \tex_spaceskip:D \c_zero_skip
            {
                    \tex_fontdimen:D 2 ~ \tex_font:D
                plus \tex_fontdimen:D 3 ~ \tex_font:D
                minus \tex_fontdimen:D 4 ~ \tex_font:D
            }
            { \tex_spaceskip:D }
        }
        {
          \skip_if_eq:nnTF \tex_spaceskip:D \c_zero_skip
            {
              \int_compare:nNnTF \g xeCJK_space_factor_int < { 2000 }
                {
                  \ xeCJK_space_skip_scale:nnn
                    { \tex_fontdimen:D 2 ~ \tex_font:D }
                }
                {
                  \skip_if_eq:nnTF \tex_xspaceskip:D \c_zero_skip
                    {
                      \ xeCJK_space_skip_scale:nnn
                        {
                          \tex_fontdimen:D 2 ~ \tex_font:D +
                          \tex_fontdimen:D 7 ~ \tex_font:D
                        }
```

```
                    }
                    { \tex_xspaceskip:D \use_none:nn }
                }
                { \tex_fontdimen:D 3 ~ \tex_font:D }
                { \tex_fontdimen:D 4 ~ \tex_font:D }
            }
            {
                \int_compare:nNnTF \g xeCJK_space_factor_int < { 2000 }
                { \ xeCJK_space_skip_scale:nnn { \tex_spaceskip:D } }
                {
                    \skip_if_eq:nnTF \tex_xspaceskip:D \c_zero_skip
                    {
                        \ xeCJK_space_skip_scale:nnn
                        {
                            \tex_spaceskip:D +
                            \tex_fontdimen:D 7 ~ \tex_font:D
                        }
                    }
                    { \tex_xspaceskip:D \use_none:nn }
                }
                { \tex_gluestretch:D \tex_spaceskip:D }
                { \tex_glueshrink:D \tex_spaceskip:D }
            }
        }
    }
\cs_new:Npn \ xeCJK_space_skip_scale:nnn #1#2#3
    {
        \dim_eval:n {#1}
        plus \fp_eval:n { \g xeCJK_space_factor_int / 1000 } #2
        minus
            \int_div_truncate:nn
                { 1000 * \int_value:w #3 } { \g xeCJK_space_factor_int } sp
    }
```

\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.

```
\int_new:N \g xeCJK_space_factor_int
\cs_new_protected:Npn \xeCJK_reset_space_factor:
    { \int_gset:Nn \g xeCJK_space_factor_int { 1000 }
\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.

```
\cs_new_protected:Npn \xeCJK_glue_to_skip:nN #1#2
    {
        \group_begin:
            \hbox_set:Nw \l xeCJK_tmp_box #1 \scan_stop:
            \ xeCJK_if_last_glue:TF
                {
                    \exp_args:NNNo \hbox_set_end:
                    \skip_set:Nn #2 { \skip_use:N \tex_lastskip:D }
                }
                {
                    \exp_args:NNNo \hbox_set_end:
                    \skip_set:Nn #2 { \dim_use:N \box_wd:N \l xeCJK_tmp_box }
                }
        \exp_args:NNNo \group_end:
        \skip_set:Nn #2 { \skip_use:N #2 }
    }
```

\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

```
\cs_new_protected:Npn \xeCJK_int_until_do:nn #1#2
    {
        \ xeCJK_int_until_do:wn \use_none:n
            { \reverse_if:N \if_int_compare:w #1#2 }
    }
```

```
\cs_new_protected:Npn \ xeCJK_int_until_do:wn \use_none:n #1
  { #1 \exp_after:wN \ xeCJK_int_until_do:wn \fi: \use_none:n {#1} }
\int_new:N \l xeCJK_begin_int
\int_new:N \l xeCJK_end_int
```

\xeCJK_peek_catcode_ignore_ spaces:NTF We set a variable \l xeCJK_peek_ignore_spaces_bool in it to identify whether the space after it is omitted or not.

```
\cs_new_protected:Npn \xeCJK_peek_catcode_ignore_spaces:NTF #1#2#3
  {
    \cs_set_eq:NN \l xeCJK_peek_search_token #1 \scan_stop:
    \cs_set_protected:Npx \ xeCJK_peek_catcode_true:w
      { \exp_not:N \group_align_safe_end: \exp_not:n {#2} }
    \cs_set_protected:Npx \ xeCJK_peek_catcode_false:w
      { \exp_not:N \group_align_safe_end: \exp_not:n {#3} }
    \bool_set_false:N \l xeCJK_peek_ignore_spaces_bool
    \group_align_safe_begin:
    \peek_after:Nw \ xeCJK_peek_catcode_ignore_spaces_branches:w
  }
\cs_new_protected:Npn \ xeCJK_peek_catcode_ignore_spaces_branches:w
  {
    \if_meaning:w \l_peek_token \c_space_token
      \bool_set_true:N \l xeCJK_peek_ignore_spaces_bool
      \exp_after:wN \peek_after:Nw
      \exp_after:wN \ xeCJK_peek_catcode_ignore_spaces_branches:w
      \tex_romannumeral:D 0
    \else:
      \if_catcode:w
        \exp_not:N \l_peek_token \exp_not:N \l xeCJK_peek_search_token
        \exp_after:wN \exp_after:wN
        \exp_after:wN \ xeCJK_peek_catcode_true:w
      \else:
        \exp_after:wN \exp_after:wN
        \exp_after:wN \ xeCJK_peek_catcode_false:w
      \fi:
    \fi:
  }
\cs_new_eq:NN \l xeCJK_peek_search_token ?
\cs_new_eq:NN \ xeCJK_peek_catcode_true:w \prg_do_nothing:
\cs_new_eq:NN \ xeCJK_peek_catcode_false:w \prg_do_nothing:
\bool_new:N \l xeCJK_peek_ignore_spaces_bool
```

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

```
\cs_new:Npn \xeCJK_token_value_class:N #1
  { \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 XƎTEX version 0.9999.0 is special and needs special handling.[4] The \meaning of XƎTEX from version 0.9999.0 onwards returns two characters for characters beyond BMP, corresponding to the first and last proxies of their UTF-16 encoding[5]. This bug was fixed in TeX Live 2015 version 0.99992[6].

```
\cs_new:Npn \xeCJK_token_value_charcode:N #1
  { \exp_after:wN \ xeCJK_get_charcode:w \token_to_meaning:N #1 \q_stop }
\group_begin:
  \cs_set:Npn \ xeCJK_tmp:w #1 ~ #2 ~ #3#4#5 \q_stop
    {
      \tl_if_empty:nTF { #4#5 }
        {
          \cs_new:Npn \ xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3 \q_stop
            { \int_eval:n { `##3 } }
        }
```

[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.

[6] See http://tug.org/pipermail/xetex/2015-May/025941.html

```
          {
            \tl_if_empty:nTF {#5}
              {
                \cs_new:Npn \ xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3##4 \q_stop
                  {
                    \int_eval:n
                      {
                        \tl_if_empty:nTF { ##4 }
                          { `##3 }
                          { ( `##3 - "D800 ) * "400 + ( `##4 - "DC00 ) + "10000 }
                      }
                  }
              }
              {
                \cs_new:Npn \ xeCJK_get_charcode:w ##1 ~ ##2 ~ ##3##4 \q_stop
                  { \int_eval:n { \tl_if_empty:nTF { ##4 } { `##3 } { "20000 } }
              }
          }
      }
    \exp_after:wN \ xeCJK_tmp:w \token_to_meaning:N ^^^^^20000 { } \q_stop
\group_end:
```

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

```
\prg_new_conditional:Npnn \xeCJK_if_CJK_class:N #1 { p , T , F , TF }
  {
    \if_cs_exist:w
      \ xeCJK_CJK_class_tl:n { \xeCJK_token_value_class:N #1 }
    \cs_end:
      \prg_return_true: \else: \prg_return_false: \fi:
  }
\cs_new:Npn \ xeCJK_CJK_class_tl:n #1
  { c xeCJK_CJK_class_ \int_eval:n {#1} _tl }
```

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

```
\prg_new_conditional:Npnn \xeCJK_if_same_class:NN #1#2 { p , T , F , TF }
  {
    \if_int_compare:w \xeCJK_token_value_class:N #1 =
                      \xeCJK_token_value_class:N #2 \exp_stop_f:
      \prg_return_true: \else: \prg_return_false: \fi:
  }
```

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

```
\cs_new_protected:Npn \xeCJK_make_boundary:
  { \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 XETEX.

```
\keys_define:nn { xeCJK / options }
  {
    xeCJKactive .voice: ,
    xeCJKactive / true .code:n = { \makexeCJKactive   } ,
    xeCJKactive / false .code:n = { \makexeCJKinactive } ,
    xeCJKactive         .default:n = { true }
  }
```

\makexeCJKactive \makexeCJKinactive

```
\NewDocumentCommand \makexeCJKactive   { }
  { \tex_XeTeXinterchartokenstate:D = \c_one_int }
\NewDocumentCommand \makexeCJKinactive { }
  { \tex_XeTeXinterchartokenstate:D = \c_zero_int }
```

Suppress the BOM.

```
\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

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

\xeCJK_new_class:n Create a new character class. #1 is the custom name.

```
\cs_new_protected:Npn \xeCJK_new_class:n #1
  {
    \int_if_exist:cTF { \ xeCJK_class_csname:n {#1} }
      { \ xeCJK_error:nx { class-already-defined } {#1} }
      {
        \exp_args:Nc \newXeTeXintercharclass
          { \ xeCJK_class_csname:n {#1} }
        \clist_new:c { g xeCJK_#1_range_clist }
        \seq_gput_right:Nn \g xeCJK_class_seq {#1}
        \seq_gput_right:Nv \g xeCJK_new_class_seq
          { \ xeCJK_class_csname:n {#1} }
      }
  }
```

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

```
\cs_new_protected:Npn \xeCJK_save_class:nn #1#2
  {
    \int_if_exist:cTF { \ xeCJK_class_csname:n {#1} }
      { \ xeCJK_error:nx { class-already-defined } {#1} }
      {
        \int_const:cn { \ xeCJK_class_csname:n {#1} } {#2}
        \clist_new:c { g xeCJK_#1_range_clist }
        \seq_gput_right:Nn \g xeCJK_class_seq {#1}
      }
  }
```

\ xeCJK_class_ csname:n The name of the control sequence corresponding to the character class name.

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

xeCJK needs the following character categories for character output. Default, CJK, FullLeft, FullRight, Boundary are predefined categories in XƎTEX, and HalfLeft, HalfRight, NormalSpace and CM are newly added to xeCJK. Variation Selectors)[7] requires XƎTEX version 0.9999.0 or above[8] and the associated fonts.

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

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

[7] http://www.unicode.org/reports/tr37/
8 http://tug.org/pipermail/xetex/2013-March/024118.html

Default
CJK
FullLeft
FullRight
Boundary

```
\xeCJK_save_class:nn { Default } { 0 }
```

XƎTEX 0.99994 expands the total number of character classes to 4096[9] .

```
\str_const:Nx \c xeCJK_xetex_version_str
  { \int_use:N \tex_XeTeXversion:D \tex_XeTeXrevision:D }
\fp_compare:nNnTF { \c xeCJK_xetex_version_str } > { 0.99993 }
  { \xeCJK_save_class:nn { Boundary } { 4095 }
  { \xeCJK_save_class:nn { Boundary } { 255 }
```

LATEX 2ε 2016/02/01 No more pre-setting CJK character classes.

```
\int_compare:nNnTF { \tex_XeTeXcharclass:D "4E00 } = \c_one_int
  {
    \xeCJK_save_class:nn { CJK }       { 1 }
    \xeCJK_save_class:nn { FullLeft } { 2 }
    \xeCJK_save_class:nn { FullRight } { 3 }
    \int_const:Nn \c xeCJK_class_begin_int { 3 }
  }
  {
    \xeCJK_new_class:n { CJK }
    \xeCJK_new_class:n { FullLeft }
    \xeCJK_new_class:n { FullRight }
    \int_const:Nn \c xeCJK_class_begin_int { 0 }
  }
```

HalfLeft
HalfRight
NormalSpace
CM
HangulJamo

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

```
\xeCJK_new_class:n { HalfLeft }
\xeCJK_new_class:n { HalfRight }
\xeCJK_new_class:n { NormalSpace }
\xeCJK_new_class:n { CM }
\xeCJK_new_class:n { HangulJamo }
```

\c xeCJK_HalfLeft_chars_ clist
\c xeCJK_HalfRight_chars_clist
\c xeCJK_NormalSpace_chars_clist

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

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

The following categorization of full-angle punctuation is derived from the XƎTEX script unicode-char-prep.pl and the Unicode database[10] .

\c xeCJK_OP_chars_ clist

Open Punctuation (OP)

U+2018	‘	U+201C	“	U+3008	〈	U+300A	《	U+300C	「	U+300E	『	U+3010	【	
U+3014	〔	U+3016	〖	U+3018	〘	U+301A	〚	U+301D	〝	U+FE17	︗	U+FE35	︵	
U+FE37	︷	U+FE39	︹	U+FE3B	︻	U+FE3D	︽	U+FE3F	︿	U+FE41	﹁	U+FE43	﹃	
U+FE47	﹇	U+FE59	﹙	U+FE5B	﹛	U+FE5D	﹝	U+FF08	（	U+FF3B	［	U+FF5B	｛	
U+FF5F	｟	U+FF62	｢											

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

```
\clist_const:Nn \c xeCJK_OP_chars_clist
  {
    "2018 , "201C ,
    "3008 , "300A , "300C , "300E , "3010 , "3014 , "3016 , "3018 , "301A , "301D ,
    "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 | $ ₣ U+FFE1 | £ | U+FFE5 | ¥ | U+FFE6 | ₩ |

```
\clist_const:Nn \c xeCJK_PR_chars_clist
  { "FE69 , "FF04 , "FFE1 , "FFE5 , "FFE6 }
```

\c xeCJK_FullLeft_chars_ clist 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.

```
\clist_new:N \c xeCJK_FullLeft_chars_clist
\clist_gconcat:NNN \c xeCJK_FullLeft_chars_clist
                   \c xeCJK_OP_chars_clist
                   \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	Th e]	U+3017	〗	U+3019	〗	U+301B	〗	U+301E	
U+301F		U+FE11	、	U+FE12	。	U+FE18	﹇	U+FE36	Oh …	U+FE38	﹀	U+FE3A	All er
U+FE3C	Spe cifi cati ons	U+FE3E	Laun dry	U+FE40	﹀	U+FE42	Th e	U+FE44	Ne ws	U+FE48	﹃	U+FE50	Th e
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.

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

\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	ゞ	U+30FD	U+30FE	ヾ
	⸗		Sister		ヽ			

According to the W3C[11] 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.

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

```
    { "30FB , "FE54 , "FE55 , "FF1A , "FF1B , "FF65 , "16FE0 }
\AtEndOfPackage
  {
    \cs_set:Npn \ xeCJK_tmp:w #1
      { \char_generate:nn { #1} { 12 } }
    \ xeCJK_add_special_punct:nn { middle }
      { \clist_map_function:NN \c xeCJK_hyphens_chars_clist \ xeCJK_tmp:w }
    \cs_undefine:N \ xeCJK_tmp:w
  }
```

\c xeCJK_EX_chars_ clist Exclamation/Interrogation (EX)

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

U+FF1F?

```
\clist_const:Nn \c xeCJK_EX_chars_clist
  { "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	；

```
\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 optional[1 2] For the sake of simplicity of implementationwe 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	っ	U+3083	や
U+3085	Name	U+3087	Date	U+308E	stopfoolingaround	U+3095	か	U+3096	け	U+30A1	A	U+30A3	Name
U+30A5	Photo	U+30A7	エ	U+30A9	オ	U+30C3	ッ	U+30E3	Contact	U+30E5	ュ	U+30E7	ョ
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	ュ	U+FF6E	ョ
U+FF6F	ッ	U+FF70	ー										

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

\c xeCJK_PO_chars_ clist Postfix Numeric (PO)

U+FE6A	%		%	U+FFE0	¢

U+FF05

```
\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.

```
\clist_new:N \c xeCJK_FullRight_chars_clist
\tl_map_inline:nn
  {
    \c xeCJK_CL_chars_clist
    \c xeCJK_NS_chars_clist
    \c xeCJK_EX_chars_clist
    \c xeCJK_IS_chars_clist
    \c xeCJK_PO_chars_clist
    \c xeCJK_hyphens_chars_clist
  }
  {
    \clist_gconcat:NNN \c xeCJK_FullRight_chars_clist
                       \c xeCJK_FullRight_chars_clist #1
  }
```

\c xeCJK_CJK_chars_ clist CJK character class,including text and punctuation.

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

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

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

- CJK Radicals Supplement (CJK Radicals Supplement)

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

- Kangxi Radicals (Kangxi radicals)

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

[12] https://github.com/CTeX-org/ctex-kit/issues/165

- Ideographic Description Characters (ideographic descriptors)

```
"2FF0 -> "2FFF ,
```

- CJK Symbols and Punctuation (CJK Symbols and Punctuation)

```
"3000 -> "303F ,
```

- Hiragana (Japanese Hiragana)

```
"3040 -> "309F ,
```

- Katakana (Japanese Katakana)

```
"30A0 -> "30FF ,
```

- Bopomofo (phonetic alphabet)

```
"3100 -> "312F ,
```

- Hangul Compatibility Jamo (Proverbial Compatibility Alphabet)

```
"3130 -> "318F ,
```

- Kanbun (hieroglyphic annotation mark)

```
"3190 -> "319F ,
```

- Bopomofo Extended (phonetic alphabet extension)

```
"31A0 -> "31BF ,
```

- CJK Strokes (CJK Strokes)

```
"31C0 -> "31EF ,
```

- Katakana Phonetic Extensions (Japanese Katakana phonetic extensions)

```
"31F0 -> "31FF ,
```

- Enclosed CJK Letters and Months (with circled CJK letters and months)

```
"3200 -> "32FF ,
```

- CJK Compatibility (CJK Compatible)

```
"3300 -> "33FF ,
```

- CJK Unified Ideographs Extension-A (CJK Unified Ideographs Extension A)

```
"3400 -> "4DBF ,
```

- Yijing Hexagrams Symbols (Yijing Hexagrams Symbols)

```
"4DC0 -> "4DFF ,
```

- CJK Unified Ideographs (Chinese, Japanese and Korean Unified Ideographs)

```
"4E00 -> "9FFF ,
```

- Yi Syllables (Yi Syllables)

```
"A000 -> "A48F ,
```

- Yi Radicals (Yi script root)

```
"A490 -> "A4CF ,
```

- Hangul Syllables (proverbial syllables)

```
"AC00 -> "D7AF ,
```

- CJK Compatibility Ideographs (CJK compatible ideographs)

```
"F900 -> "FAFF ,
```

- Vertical Forms

```
"FE10 -> "FE1F ,
```

- CJK Compatibility Forms (CJK compatible forms)

```
"FE30 -> "FE4F,
```

- Halfwidth and Fullwidth Forms

```
"FF00 -> "FFEF,
```

- Ideographic Symbols and Punctuation

```
"16FE0 -> "16FFF,
```

- Tangut (Xixia language)

```
"17000 -> "187FF,
```

- Tangut Components (Xixian radicals)

```
"18800 -> "18AFF,
```

- Khitan Small Script (契丹小字)

```
"18B00 -> "18CFF,
```

- Tangut Supplement (Xixia Text Supplement)

```
"18D00 -> "18D7F,
```

- Kana Extended-B (Japanese kana extension B)

```
"1AFF0 -> "1AFFF,
```

- Kana Supplement (Japanese kana supplement)

```
"1B000 -> "1B0FF,
```

- Kana Extended-A (Japanese kana extended A)

```
"1B100 -> "1B12F,
```

- Small Kana Extension (small Japanese kana extension)

```
"1B130 -> "1B16F,
```

- Nushu (Women's Book)

```
"1B170 -> "1B2FF,
```

- Enclosed Ideographic Supplement

```
"1F200 -> "1F2FF,
```

- CJK Unified Ideographs Extension-B (CJK Unified Ideographs Extension B)

```
"20000 -> "2A6DF,
```

- CJK Unified Ideographs Extension-C (CJK Unified Ideographs Extension C)

```
"2A700 -> "2B73F,
```

- CJK Unified Ideographs Extension-D (CJK Unified Ideographs Extension D)

```
"2B740 -> "2B81F,
```

- CJK Unified Ideographs Extension-E (CJK Unified Ideographs Extension E)

```
"2B820 -> "2CEAF,
```

- CJK Unified Ideographs Extension-F (CJK Unified Ideographs Extension F)

```
"2CEB0 -> "2EBEF,
```

- CJK Compatibility Ideographs Supplement (CJK Compatibility Ideographs Supplement)

```
"2F800 -> "2FA1F,
```

- CJK Unified Ideographs Extension-G (CJK Unified Ideographs Extension G)

```
"30000 -> "3134F
```

```
}
```

\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
```

```
\clist_const:Nn \c xeCJK_CM_chars_clist
{
```

- Diacritics (Tone Signatures)

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

- Japanese kana dots

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

- Variation Selectors

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

- Variation Selectors Supplement

```
"E0100 -> "E01EF
}
```

\c xeCJK_HangulJamo_chars_clist Korean alphabet.

```
\clist_const:Nn \c xeCJK_HangulJamo_chars_clist
{
```

- Hangul Jamo (proverbial alphabet)

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

- Hangul Jamo Extended-A (Proverbs Extended A)

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

- Hangul Jamo Extended-B (Proverbs Extended B)

```
"D7B0 -> "D7FF
}
```

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.

```
\cs_new:Npn \xeCJK_class_num:n #1
  { \use:c { \ xeCJK_class_csname:n {#1} } }
\NewDocumentCommand \xeCJKDeclareCharClass { s > { \TrimSpaces } m m }
{
  \xeCJK_declare_char_class:nn {#2} {#3}
  \IfBooleanT {#1} { \xeCJKResetPunctClass }
}
```

\xeCJKDeclareCharClass

\xeCJK_declare_char_class:nn 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
_xeCJK_set_char_class_aux:Nnw supports the usage similar to "1100 -> "11FF start/stop range.

```
\cs_new_protected:Npn \xeCJK_declare_char_class:nn #1#2
  {
    \clist_set:Nx \l xeCJK_tmp_clist {#2}
    \xeCJK_declare_char_class:nN {#1} \l xeCJK_tmp_clist
  }
\cs_new_protected:Npn \xeCJK_declare_char_class:nN #1#2
  {
    \clist_gconcat:ccN
      { g xeCJK_#1_range_clist } { g xeCJK_#1_range_clist } #2
    \clist_map_inline:Nn #2
      {
        \str_if_eq:nnF {##1} { -> }
          {
            \ xeCJK_set_char_class_aux:Nnw \ xeCJK_set_char_class:nnn {##1}
              { \xeCJK_class_num:n {#1} }
          }
      }
    \xeCJK_set_char_class:nnn { "3099 } { "309A } { \xeCJK_class_num:n { CM } }
  }
\NewDocumentCommand \ xeCJK_set_char_class_aux:Nnw
  { m > { \SplitArgument { 1 } { -> } } m } { #1 #2 }
\cs_generate_variant:Nn \clist_gconcat:NNNN { cc }
```

\ xeCJK_check_num_ range:nnNN

```
\cs_new_protected:Npn \ xeCJK_check_num_range:nnNN #1#2#3#4
  {
    \bool_lazy_or:nnTF
      { \tl_if_blank_p:n {#1} }
      { \tl_if_blank_p:n {#2} }
      {
        \int_set:Nn #3 { \tl_if_blank:nTF {#1} {#2} {#1} }
        \int_set_eq:NN #3 #4
      }
      {
        \int_set:Nn #3 { \int_min:nn {#1} { \tl_if_novalue:nTF {#2} {#1} {#2} } }
        \int_set:Nn #4 { \int_max:nn {#1} { \tl_if_novalue:nTF {#2} {#1} {#2} } }
      }
  }

\token_if_letter:NF ^^^^ac00
  {
    \int_set:Nn \l xeCJK_begin_int { "AC00 }
    \int_set:Nn \l xeCJK_end_int   { "D7A3 }
    \xeCJK_int_until_do:nn { \l xeCJK_begin_int > \l xeCJK_end_int }
      {
        \char_set_catcode_letter:n { \l xeCJK_begin_int }
        \int_incr:N \l xeCJK_begin_int
      }
  }
```

\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.

```
\cs_new_protected:Npn \xeCJK_set_char_class:nnn #1#2#3
  {
    \ xeCJK_check_num_range:nnNN {#1} {#2} \l xeCJK_begin_int \l xeCJK_end_int
    \int_set:Nn \l xeCJK_tmp_int {#3}
    \xeCJK_int_until_do:nn { \l xeCJK_begin_int > \l xeCJK_end_int }
      {
        \tex_XeTeXcharclass:D \l xeCJK_begin_int = \l xeCJK_tmp_int
        \int_incr:N \l xeCJK_begin_int
      }
  }
```

\ 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.

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

```
  {
    \int_set:Nn \l xeCJK_tmp_int { \xeCJK_class_num:n {#2} }
    \clist_map_inline:cn { c xeCJK_#1_chars_clist }
      { \tex_XeTeXcharclass:D ##1 = \l xeCJK_tmp_int }
  }
```

\normalspacedchars Declare unspaced characters before and after.

```
\NewDocumentCommand \normalspacedchars { m }
  {
    \tl_map_inline:nn {#1}
      { \tex_XeTeXcharclass:D `##1 = \xeCJK_class_num:n { NormalSpace }
  }
```

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

```
\NewDocumentCommand \xeCJKResetPunctClass { }
  {
    \clist_gclear:N \g xeCJK_HalfLeft_range_clist
    \clist_gclear:N \g xeCJK_HalfRight_range_clist
    \clist_gclear:N \g xeCJK_FullLeft_range_clist
    \clist_gclear:N \g xeCJK_FullRight_range_clist
    \xeCJK_declare_char_class:nnN { HalfLeft } \c xeCJK_HalfLeft_chars_clist
    \xeCJK_declare_char_class:nnN { HalfRight } \c xeCJK_HalfRight_chars_clist
    \xeCJK_declare_char_class:nnN { FullLeft } \c xeCJK_FullLeft_chars_clist
    \xeCJK_declare_char_class:nnN { FullRight } \c xeCJK_FullRight_chars_clist
  }
```

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

```
\NewDocumentCommand \xeCJKResetCharClass { }
  {
    \clist_gclear:N \g xeCJK_CJK_range_clist
    \clist_gclear:N \g xeCJK_NormalSpace_range_clist
    \clist_gclear:N \g xeCJK_CM_range_clist
    \clist_gclear:N \g xeCJK_HangulJamo_range_clist
    \xeCJK_declare_char_class:nN { CJK } \c xeCJK_CJK_chars_clist
    \xeCJK_declare_char_class:nN { NormalSpace } \c xeCJK_NormalSpace_chars_clist
    \xeCJK_declare_char_class:nN { CM } \c xeCJK_CM_chars_clist
    \xeCJK_declare_char_class:nN { HangulJamo } \c xeCJK_HangulJamo_chars_clist
    \xeCJKResetPunctClass
  }
```

Set the character class.

```
\xeCJKResetCharClass
```

\xeCJK_inter_class_toks:nnn Insert content between adjacent classes.

```
\cs_new_protected:Npn \xeCJK_inter_class_toks:nnn #1#2#3
  {
    \tex_XeTeXinterchartoks:D \xeCJK_class_num:n {#1} ~
                              \xeCJK_class_num:n {#2} = {#3}
  }
\cs_generate_variant:Nn \xeCJK_inter_class_toks:nnn { nne }
```

\xeCJK_get_inter_class_toks:nn Fetch the content between adjacent classes.

```
\cs_new:Npn \xeCJK_get_inter_class_toks:nn #1#2
  {
    \tex_the:D \tex_XeTeXinterchartoks:D \xeCJK_class_num:n {#1} ~
                                         \xeCJK_class_num:n {#2}
  }
```

\xeCJK_clear_inter_class_toks:nn Clear the content between adjacent classes. Note that assigning null values directly may cause XETEX 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 XETEX bug has been fixed in version 0.999992.[13] .

```
\cs_new_protected:Npn \xeCJK_clear_inter_class_toks:nn #1#2
  { \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.

```
\cs_new_protected:Npn \xeCJK_pre_inter_class_toks:nnn #1#2#3
  {
    \xeCJK_inter_class_toks:nne {#1} {#2}
      { \exp_not:n {#3} \xeCJK_get_inter_class_toks:nn {#1} {#2} }
  }
\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.

```
\cs_new_protected:Npn \xeCJK_app_inter_class_toks:nnn #1#2#3
  {
    \xeCJK_inter_class_toks:nne {#1} {#2}
      { \xeCJK_get_inter_class_toks:nn {#1} {#2} \exp_not:n {#3} }
  }
\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.

```
\cs_new_protected:Npn \xeCJK_copy_inter_class_toks:nnnn #1#2#3#4
  {
    \tl_set:Nx \l xeCJK_tmp_tl
      { \xeCJK_get_inter_class_toks:nn {#3} {#4} }
    \tl_if_empty:NTF \l xeCJK_tmp_tl
      {
        \tl_set:Nx \l xeCJK_tmp_tl
          { \xeCJK_get_inter_class_toks:nn {#1} {#2} }
        \tl_if_empty:NF \l xeCJK_tmp_tl
          { \xeCJK_clear_inter_class_toks:nn {#1} {#2} }
      }
      { \xeCJK_inter_class_toks:nne {#1} {#2} { \exp_not:o \l xeCJK_tmp_tl } }
  }
```

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

```
\cs_new_protected:Npn \xeCJK_replace_inter_class_toks:nnnn #1#2#3#4
  {
    \tl_set:Nx \l xeCJK_tmp_tl
      { \xeCJK_get_inter_class_toks:nn {#1} {#2} }
    \tl_if_empty:NF \l xeCJK_tmp_tl
      {
        \tl_replace_all:Nnn \l xeCJK_tmp_tl {#3} {#4}
        \xeCJK_inter_class_toks:nne {#1} {#2}
          { \exp_not:o \l xeCJK_tmp_tl }
      }
  }
```

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

```
\cs_new_protected:Npn \xeCJK_clear_Boundary_and_CJK_toks:
  { }
\cs_new_protected:Npn \ xeCJK_update_clear_toks:n #1
  {
```

[13] http://tug.org/svn/texlive?view=revision&revision=53880

```
    \cs_gset_protected:Npx \xeCJK_clear_Boundary_and_CJK_toks:
      {
        \exp_not:o { \xeCJK_clear_Boundary_and_CJK_toks: }
        \tex_XeTeXinterchartoks:D
          \xeCJK_class_num:n { Boundary } ~
          \xeCJK_class_num:n {#1} = { \exp_not:N \prg_do_nothing: }
      }
  }
```

\g xeCJK_base_class_seq
\g xeCJK_non_CJK_class_seq
\g xeCJK_CJK_class_seq

Save the pre-defined character classes of macro packages.

```
\seq_new:N \g xeCJK_base_class_seq
\seq_gset_eq:NN \g xeCJK_base_class_seq \g xeCJK_class_seq
\seq_new:N \g xeCJK_non_CJK_class_seq
\seq_gset_from_clist:Nn \g xeCJK_non_CJK_class_seq
  { Default , HalfLeft , HalfRight , NormalSpace , Boundary }
\seq_new:N \g xeCJK_CJK_class_seq
\cs_new_protected:Npn \ xeCJK_save_CJK_class:n #1
  {
    \seq_gput_right:Nn \g xeCJK_CJK_class_seq {#1}
    \tl_const:cn
      { \ xeCJK_CJK_class_tl:n { \use:c { \ xeCJK_class_csname:n {#1} } } }
      {#1}
    \ xeCJK_update_clear_toks:n {#1}
  }
\clist_map_function:nN
  { 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:
\xeCJK_class_group_end:

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

```
\cs_new_protected:Npn \xeCJK_class_group_begin:
  {
    \c_group_begin_token
    \bool_set_true:N \l xeCJK_CJK_group_bool
    \xeCJK_reset_space_factor:
    \int_zero:N \tex_XeTeXdashbreakstate:D
  }
\bool_new:N \l xeCJK_CJK_group_bool
\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.

```
\AtEndOfPackage
  {
    \seq_map_inline:Nn \g xeCJK_class_seq
      {
        \str_if_eq:nnTF {#1} { CM }
          { \xeCJK_copy_inter_class_toks:nnnn { CM } {#1} { CJK } { CJK }
          {
```

```
                \xeCJK_copy_inter_class_toks:nnnn { CM } {#1} { CJK } {#1}
                \str_if_eq:nnF {#1} { CJK }
                  { \xeCJK_copy_inter_class_toks:nnnn {#1} { CM } {#1} { CJK } }
              }
          }
    }
```

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

```
\AtEndOfPackage
  {
    \seq_map_inline:Nn \g xeCJK_class_seq
      {
        \str_if_eq:nnF {#1} { HangulJamo }
          {
            \xeCJK_copy_inter_class_toks:nnnn { HangulJamo } {#1} { CJK } {#1}
            \xeCJK_copy_inter_class_toks:nnnn {#1} { HangulJamo } {#1} { CJK }
          }
      }
  }
\clist_map_inline:nn { Default , HalfLeft , HalfRight , NormalSpace }
  {
    \xeCJK_inter_class_toks:nnn {#1} { CJK }
      {
        \xeCJK_class_group_begin:
        \xeCJK_select_font:
        \xeCJK_clear_inter_class_toks:nn {#1} { CJK }
        \xeCJK_clear_Boundary_and_CJK_toks:
        \xeCJK_fallback_symbol:NN
        \CJKsymbol
      }
    \xeCJK_inter_class_toks:nnn { CJK } {#1} { \xeCJK_class_group_end: }
  }
\clist_map_inline:nn { Default , HalfLeft }
  {
    \xeCJK_inter_class_toks:nnn { Boundary } {#1}
      { \xeCJK_Boundary_and_Default: }
    \xeCJK_app_inter_class_toks:nnn { CJK } {#1}
      { \CJKecglue }
  }
\cs_new_protected:Npn \xeCJK_Boundary_and_Default:
  { \xeCJK_check_for_ecglue: }
\cs_new_protected:Npn \ xeCJK_check_for_xecglue:
  {
    \ xeCJK_if_last_glue:TF
      { \ xeCJK_replace_space: }
      { \ xeCJK_check_for_ecglue: }
  }
\cs_new_protected:Npn \ xeCJK_check_for_ecglue:
  {
    \xeCJK_if_last_node:nTF { CJK }
      { \use_i:nn }
      { \xeCJK_if_last_node:nTF { CJK-widow } }
      { \xeCJK_remove_node: \CJKecglue }
      {
        \xeCJK_if_last_node:nT { CJK-space }
          { \xeCJK_remove_node: \xeCJK_space_or_xecglue: }
      }
  }
\cs_new_eq:NN \ x e C J K _ c h e c k _ f o r _ e c g l u e : \ xeCJK_check_for_ecglue:
```

\xeCJK_Boundary_and_Default:

\ 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.

761 \cs_new_protected:Npn \ xeCJK_replace_space:

```
  {
    \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
    \tex_unskip:D
    \xeCJK_if_last_node:nTF { CJK-space }
      { \xeCJK_remove_node: \CJKecglue }
      {
        \xeCJK_if_last_node:nTF { CJK }
          {
            \skip_if_eq:nnTF
              { \l xeCJK_last_skip }
              { \c_xeCJK_space_skip_tl }
              { \xeCJK_remove_node: \CJKecglue }
              { \skip_horizontal:N \l xeCJK_last_skip }
          }
          { \skip_horizontal:N \l xeCJK_last_skip }
      }
  }
\skip_new:N \l xeCJK_last_skip

\clist_map_inline:nn { Default , HalfRight }
  {
    \xeCJK_inter_class_toks:nnn {#1} { Boundary }
      {
        \int_gset_eq:NN \g xeCJK_space_factor_int \tex_spacefactor:D
        \peek_meaning_remove:NTF \tex_italiccorrection:D
          {
            \tex_italiccorrection:D
            { \xeCJK_make_node:n { default } }
          }
          {
            \token_if_space:NTF \l_peek_token
              { \xeCJK_make_space_node: }
              { { { \xeCJK_make_node:n { default } } }
          }
      }
    \xeCJK_pre_inter_class_toks:nnn {#1} { CJK } { \CJKecglue }
  }

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

\xeCJK_Boundary_and_NormalSp:
\cs_new_protected:Npn \xeCJK_Boundary_and_NormalSp:
  { \xeCJK_check_for_ecglue_normalsp: }
\cs_new_protected:Npn \ xeCJK_check_for_xecglue_normalsp:
  {
    \ xeCJK_if_last_glue:TF
      { \ xeCJK_replace_space: }
      { \ xeCJK_check_for_ecglue_normalsp: }
  }
\cs_new_protected:Npn \ xeCJK_check_for_ecglue_normalsp:
  {
    \xeCJK_if_last_node:nT { CJK-space }
      { \xeCJK_remove_node: \xeCJK_space_or_xecglue: }
  }
\cs_new_eq:NN \xeCJK_check_for_ecglue_normalsp:
                \ xeCJK_check_for_ecglue_normalsp:

\xeCJK_inter_class_toks:nnn { NormalSpace } { Boundary }
  {
    \int_gset_eq:NN \g xeCJK_space_factor_int \tex_spacefactor:D
    \peek_meaning_remove:NTF \tex_italiccorrection:D
      {
        \tex_italiccorrection:D
        { \xeCJK_make_node:n { normalspace } }
      }
      {
        \token_if_space:NTF \l_peek_token
          { \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_aligni_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: \CJKecglue }
902               {
903                 \ xeCJK_if_last_math:TF
904                   { \CJKecglue }
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* \ xeCJK_if_last_hlist:*TF* \ xeCJK_if_last_math:*TF* \ xeCJK_if_last_glue:*TF* \ xeCJK_if_last_kern:*TF* \ xeCJK_if_last_penalty:*TF*

Some ε-TEX node determination functions.

```
913 \group_begin:
914 \cs_set:Npn \ xeCJK_tmp:nn #1
915   {
916     \exp_args:Ncc \ xeCJK_tmp_aux:NNn
917       { xeCJK_if_last_ #1 : }
918       { c xeCJK_ #1 _node }
919   }
920 \cs_set:Npn \ xeCJK_tmp_aux:NNNn #1#2#3
921   {
922     \int_const:Nn #2 {#3}
923     \prg_new_conditional:Npnn #1 { T , F , TF }
924       {
925         \if_int_compare:w \tex_lastnodetype:D = #2
926           \prg_return_true: \else: \prg_return_false: \fi:
927       }
928   }
929 \ xeCJK_tmp:nn { none }    { -1 }
930 \ xeCJK_tmp:nn { hlist }   { 1 }
931 \ xeCJK_tmp:nn { math }    { 10 }
932 \ xeCJK_tmp:nn { glue }    { 11 }
933 \ xeCJK_tmp:nn { kern }    { 12 }
934 \ xeCJK_tmp:nn { penalty } { 13 }
935 \group_end:
```

\xeCJK_if_last_node_p:n \xeCJK_if_last_node:*nTF*

```
936 \prg_new_conditional:Npnn \xeCJK_if_last_node:n #1 { p , T , F , TF }
937   {
938     \if_dim:w
939       \cs_if_exist_use:cTF { c xeCJK_#1_node_dim }
940         { = \tex_lastkern:D }
941         { \use:c { c xeCJK_#1_node_skip } = \tex_lastskip:D }
942       \prg_return_true: \else: \prg_return_false: \fi:
943   }
```

\xeCJK_declare_node:n \xeCJK_make_node:n

is used to determine the various kern and glue inserted.

```
944 \cs_new_protected:Npn \xeCJK_declare_node:n #1
945   {
946     \int_gincr:N \g xeCJK_node_int
947     \dim_if_exist:cTF { c xeCJK_#1_node_dim }
948       { \dim_gset:cn } { \dim_const:cn }
949       { c xeCJK_#1_node_dim } { \g xeCJK_node_int sp }
950   }
951 \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       } ,
```

```
    xCJKecglue .choice: ,
    xCJKecglue / true       .code:n =
      {
        \bool_set_true:N \l xeCJK_xecglue_bool
        \cs_set_eq:NN \xeCJK_space_or_xecglue: \CJKecglue
        \cs_set_eq:NN \xeCJK_make_space_node: \xeCJK_make_space_node:
        \cs_set_eq:NN \xeCJK_check_for_xglue: \ xeCJK_check_for_xglue:
        \cs_set_eq:NN \xeCJK_check_for_ecglue: \ xeCJK_check_for_xecglue:
        \cs_set_eq:NN
          \xeCJK_check_for_ecglue_normalsp:
          \ xeCJK_check_for_xecglue_normalsp:
      } ,
    xCJKecglue / false      .code:n =
      {
        \bool_set_false:N \l xeCJK_xecglue_bool
        \cs_set_eq:NN  \ x e C J K _ s p a c e _ o r _ x e c g l u e : \xeCJK_space_glue:
        \xeCJK_cs_clear:N \xeCJK_make_space_node:
        \xeCJK_cs_clear:N \xeCJK_check_for_xglue:
        \cs_set_eq:NN  \ x e C J K _ c h e c k _ f o r _ e c g l u e : \ xeCJK_check_for_ecglue:
        \cs_set_eq:NN
          \xeCJK_check_for_ecglue_normalsp:
          \ xeCJK_check_for_ecglue_normalsp:
      } ,
    xCJKecglue / unknown .code:n =
      {
        \bool_set_true:N \l xeCJK_xecglue_bool
        \cs_set_protected:Npn \CJKecglue {#1}
        \xeCJK_glue_to_skip:nN {#1} \l xeCJK_ecglue_skip
        \cs_set_eq:NN \xeCJK_space_or_xecglue: \CJKecglue
        \cs_set_eq:NN \xeCJK_make_space_node: \xeCJK_make_space_node:
        \cs_set_eq:NN \xeCJK_check_for_xglue: \ xeCJK_check_for_xglue:
        \cs_set_eq:NN \xeCJK_check_for_ecglue: \ xeCJK_check_for_xecglue:
        \cs_set_eq:NN
          \xeCJK_check_for_ecglue_normalsp:
          \ xeCJK_check_for_xecglue_normalsp:
      } ,
    xCJKecglue          .default:n = { true }
  }
\cs_new_eq:NN \xeCJK_space_glue: \c_space_tl
\skip_new:N \l xeCJK_ecglue_skip
\bool_new:N \l xeCJK_xecglue_bool
```

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

```
\keys_define:nn { xeCJK / options }
  {
    CJKspace .choice: ,
    CJKspace / true .code:n =
      {
        \bool_set_true:N \l xeCJK_reserve_space_bool
        \cs_set_protected:Npn \ xeCJK_ccglue_or_space:
          { \xeCJK_space_glue: }
      } ,
    CJKspace / false .code:n =
      {
        \bool_set_false:N \l xeCJK_reserve_space_bool
        \cs_set_protected:Npn \ xeCJK_ccglue_or_space:
          { \CJKglue }
      } ,
    CJKspace       .default:n = { true } ,
    space              .meta:n = { CJKspace = true } ,
    nospace            .meta:n = { CJKspace = false }
  }
\bool_new:N \l xeCJK_reserve_space_bool

\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 problems[14] . 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.

```
\cs_new_protected:Npn \xeCJK_CJK_and_Boundary:w
  {
    \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
      {
        \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
          { \xeCJK_class_group_end: \xeCJK_space_or_xecglue: }
          { \xeCJK_class_group_end: \CJKecglue }
      }
      {
        \group_align_safe_begin:
        \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
          {
            \token_if_macro:NTF \l_peek_token
              { \ xeCJK_boundary_reserve_space: }
              { \ xeCJK_boundary_group_end:n { CJK-space } }
          }
          {
            \token_if_eq_meaning:NNTF \l_peek_token \scan_stop:
              { \ xeCJK_CJK_and_Boundary_relax:N }
              { \ xeCJK_boundary_group_end:n { CJK } }
          }
      }
  }
\cs_new_protected:Npn \ xeCJK_boundary_reserve_space:
  {
    \ xeCJK_boundary_group_end:n { CJK-space }
    \xeCJK_space_or_xecglue:
  }
\cs_new_protected:Npn \ xeCJK_CJK_and_Boundary_relax:N #1
  {
    \ xeCJK_boundary_group_end:n { CJK }
    \token_if_eq_meaning:NNTF #1 \scan_stop:
      {#1} { \cs_set_eq:NN #1 \scan_stop: #1 }
  }
\cs_new_protected:Npn \ xeCJK_boundary_group_end:n #1
  {
    \group_align_safe_end:
    \xeCJK_class_group_end:
    { \xeCJK_make_node:n {#1} }
  }
```

\xeCJK_ignore_spaces:w

```
\cs_new_protected:Npn \xeCJK_ignore_spaces:w
  {
    \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
      {
        \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
          { \xeCJK_space_or_xecglue: } { \CJKecglue }
      }
      {
        \bool_if:NT \l xeCJK_peek_ignore_spaces_bool
          {
            \dim_case:nn { \tex_lastkern:D }
              {
                { \ xeCJK_node:n { CJK } }
                { \xeCJK_remove_node: \xeCJK_make_node:n { CJK-space } }
                { \ xeCJK_node:n { default } }
                { \xeCJK_remove_node: \xeCJK_make_space_node: }
              }
            \group_align_safe_begin:
            \token_if_macro:NTF \l_peek_token
              { \ xeCJK_reserve_space_aux: }
```

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

```
                { \group_align_safe_end: }
            }
        }
    }
\cs_new_protected:Npn \ xeCJK_reserve_space_aux:
    {
        \group_align_safe_end:
        \xeCJK_space_or_xecglue:
    }
\xeCJK_inter_class_toks:nnn { CJK } { CJK }
    { \xeCJK_CJK_and_CJK:N }
\cs_new_protected:Npn \xeCJK_CJK_and_CJK:N
    {
        \CJKglue
        \xeCJK_fallback_symbol:NN
        \CJKsymbol
    }
\xeCJK_inter_class_toks:nnn { FullLeft } { CJK }
    {
        \xeCJK_FullLeft_and_CJK:
        \xeCJK_fallback_symbol:NN
        \CJKsymbol
    }
\xeCJK_inter_class_toks:nnn { FullRight } { CJK }
    {
        \xeCJK_FullRight_and_CJK:
        \xeCJK_fallback_symbol:NN
        \CJKsymbol
    }
\seq_map_inline:Nn \g xeCJK_non_CJK_class_seq
    {
        \clist_map_inline:nn { FullLeft , FullRight }
            {
                \xeCJK_inter_class_toks:nne {#1} {##1}
                    { \exp_not:c { xeCJK_Default_and_##1:nN } {#1} }
                \xeCJK_inter_class_toks:nne {##1} {#1}
                    { \exp_not:c { xeCJK_##1_and_Default: } }
            }
    }
\xeCJK_inter_class_toks:nnn { Boundary } { FullLeft }
    { \xeCJK_Boundary_and_FullLeft:N }
\xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
    { \xeCJK_Boundary_and_FullRight:N }
\xeCJK_inter_class_toks:nnn { FullLeft } { Boundary }
    { \xeCJK_FullLeft_and_Boundary: }
\xeCJK_inter_class_toks:nnn { FullRight } { Boundary }
    { \xeCJK_FullRight_and_Boundary: }
\cs_new_protected:Npn \xeCJK_FullLeft_and_Boundary:
    {
        \ xeCJK_punct_if_middle:NTF \g xeCJK_last_punct_tl
            {
                \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
                \xeCJK_class_group_end:
                \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
                \xeCJK_no_break:
                \ xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
            }
            {
                \xeCJK_class_group_end:
                \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
                \ xeCJK_nobreak_zero_glue:
            }
        \tex_ignorespaces:D
    }
```

\xeCJK_FullRight_and_Boundary:
```
\cs_new_protected:Npn \xeCJK_FullRight_and_Boundary:
  {
    \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
    \xeCJK_class_group_end:
    \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
    \ xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
    \tex_ignorespaces:D
  }
```

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

```
\cs_new_protected:Npn \xeCJK_punct_node:N #1
  {
    \ xeCJK_punct_bound_unitization:NN #1 \l xeCJK_tmp_dim
    \ xeCJK_make_node:N \l xeCJK_tmp_dim
    \dim_set:Nn \l xeCJK_tmp_dim { `#1 sp }
    \ xeCJK_make_node:N \l xeCJK_tmp_dim
  }
```

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

```
\cs_new_protected:Npn \ xeCJK_punct_bound_unitization:NN #1#2
  {
    \dim_set:Nn #2
      {
        \dim_max:nn
          { \c_zero_dim }
          { \ xeCJK_use_punct_dim:nNN { bound } \c xeCJK_right_tl #1 }
      }
    \dim_compare:nNnF {#2} < { 1pt }
      { \dim_set:Nn #2 { -1pt * \dim_ratio:nn {#2} { \c_max_dim } } }
  }
```

\xeCJK_punct_bound_kern:N
\ xeCJK_punct_bound_kern:NN
```
\cs_new_protected:Npn \xeCJK_punct_bound_kern:N #1
  {
    \exp_after:wN \ xeCJK_punct_bound_kern:NN
      \g xeCJK_last_punct_tl #1
  }
\cs_new_protected:Npn \ xeCJK_punct_bound_kern:NN #1#2
  {
    \xeCJK_get_punct_bounds:NN \l xeCJK_aligni_tl #1
    \xeCJK_get_punct_kerning:NN #1 #2
    \ xeCJK_punct_bound_unitization:NN #1 \l xeCJK_tmp_dim
    \skip_set:Nn \l xeCJK_punct_kern_skip
      { \ xeCJK_use_dim_or_skip:nNN { bound_kern } #1 #2 }
    \dim_compare:nNnF \l xeCJK_tmp_dim = \l xeCJK_last_bound_dim
      { \ xeCJK_punct_bound_kern_ratio:NN #1 #2 }
    \bool_if:NTF \l xeCJK_last_penalty_bool
      {
        \tex_penalty:D \l xeCJK_last_penalty_int
        \skip_horizontal:N
      }
      { \ xeCJK_punct_bound_kern_aux:NNN #1 #2 }
      \l xeCJK_punct_kern_skip
  }
\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.

```
\cs_new_protected:Npn \ xeCJK_punct_bound_kern_ratio:NN #1#2
  {
    \dim_set:Nn \l xeCJK_bound_dim
      { \ xeCJK_use_punct_dim:nNN { bound_width } #1 #2 }
    \dim_compare:nNnT \l xeCJK_bound_dim > \c_zero_dim
      {
        \dim_compare:nNnF \l xeCJK_last_bound_dim > \c_zero_dim
          {
```

```
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
\ xeCJK_nobreak_hskip:n
\ xeCJK_punct_bound_kern:N
\ xeCJK_punct_bound_breakable_kern:N

```
1273  \cs_new_protected:Npn \ xeCJK_nobreak_hskip:N
1274        { \xeCJK_no_break: \skip_horizontal:N }
1275  \cs_new_protected:Npn \ xeCJK_nobreak_hskip: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 ~
```

```
      depth \c_zero_dim
      height \c_zero_dim \scan_stop:
  }
```

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

```
\cs_new_protected:Npn \xeCJK_punct_rule:NN #1#2
  {
    \tex_vrule:D
      width \xeCJK_use_punct_dim:nNN { rule } #1 #2 ~
      depth \c_zero_dim
      height \c_zero_dim \scan_stop:
  }
```

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

```
\cs_new_protected:Npn \xeCJK_punct_glue:NN #1#2
  { \xeCJK_punct_hskip:n { \xeCJK_use_dim_or_skip:nNN { glue } #1 #2 } }
\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

```
\cs_new_protected:Npn \xeCJK_punct_kern:NN #1#2
  {
    \str_if_eq:eeTF {#1} {#2}
      { \xeCJK_punct_nobreak_kern:NN }
      {
        \xeCJK_punct_if_long:NTF #1
          { \xeCJK_punct_breakable_kern:NN }
          {
            \xeCJK_punct_if_long:NTF #2
              { \xeCJK_punct_breakable_kern:NN }
              { \xeCJK_punct_nobreak_kern:NN }
          }
      }
    #1 #2
  }
\cs_new_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_kern:NN
```

\xeCJK_punct_nobreak_kern:NN

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

\xeCJK_punct_breakable_kern:NN

```
\cs_new_protected:Npn \xeCJK_punct_breakable_kern:NN #1#2
  {
    \exp_after:wN \xeCJK_punct_if_right:NT #1
      { \xeCJK_punct_rule:NN \c xeCJK_right_tl #1 }
    \xeCJK_punct_breakable_kern:n
      { \xeCJK_use_dim_or_skip:nNN { bound_kern } #1 #2 }
    \xeCJK_punct_if_right:NF #2
      { \xeCJK_punct_rule:NN \c xeCJK_left_tl #2 }
  }
\cs_new_eq:NN \xeCJK_punct_breakable_kern:n \skip_horizontal:n
```

\g_xeCJK_last_punct_tl is used to record the current punctuation mark.

```
\tl_new:N \g_xeCJK_last_punct_tl
```

\xeCJK_FullLeft_and_CJK:

```
\cs_new_protected:Npn \xeCJK_FullLeft_and_CJK:
  {
    \xeCJK_punct_if_middle:NTF \g_xeCJK_last_punct_tl
      {
        \xeCJK_punct_rule:NN \c xeCJK_right_tl \g_xeCJK_last_punct_tl
        \xeCJK_no_break:
        \xeCJK_punct_glue:NN \c xeCJK_left_tl \g_xeCJK_last_punct_tl
      }
      { }
    \xeCJK_select_font:
  }
```

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

```
\cs_new_protected:Npn \xeCJK_FullLeft_and_Default:
  {
    \ xeCJK_punct_if_middle:NTF \g xeCJK_last_punct_tl
      {
        \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
        \xeCJK_class_group_end: \xeCJK_no_break:
        \ xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
      }
      {
        \xeCJK_class_group_end:
        \ xeCJK_nobreak_zero_glue:
      }
  }
\cs_new_protected:Npn \ xeCJK_nobreak_zero_glue:
  {
    \tex_penalty:D \c xeCJK_nobreak_penalty_int
    \skip_horizontal:N \c_zero_skip
  }
\cs_new_protected:Npn \ xeCJK_zero_glue:
  { \skip_horizontal:N \c_zero_skip }
```

\xeCJK_FullRight_and_CJK:

```
\cs_new_protected:Npn \xeCJK_FullRight_and_CJK:
{
    \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
\ xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl  \
xeCJK_select_font:
    \CJKglue
}
```

\xeCJK_FullRight_and_Default:

```
\cs_new_protected:Npn \xeCJK_FullRight_and_Default:
  {
    \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
    \xeCJK_class_group_end:
    \ xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
  }
```

\xeCJK_Default_and_FullLeft:nN

```
\cs_new_protected:Npn \xeCJK_Default_and_FullLeft:nN #1#2
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #2
    \ xeCJK_Default_and_FullLeft_glue:N #2
    \xeCJK_class_group_begin:
    \xeCJK_select_punct_font:
    \xeCJK_clear_inter_class_toks:nn {#1} { FullLeft }
    \xeCJK_clear_Boundary_and_CJK_toks:
    \tl_gset:Nn \g xeCJK_last_punct_tl {#2}
    \ xeCJK_punct_rule:NN \c xeCJK_left_tl #2
    \xeCJK_fallback_punct_symbol:NN
    \CJKpunctsymbol #2
  }
\cs_new_protected:Npn \ xeCJK_Default_and_FullLeft_glue:N #1
  { \ xeCJK_punct_glue:NN \c xeCJK_left_tl #1 }
```

\xeCJK_CJK_and_FullLeft:N

```
\cs_new_protected:Npn \xeCJK_CJK_and_FullLeft:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #1
    \ xeCJK_CJK_and_FullLeft_glue:N #1
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \ xeCJK_punct_rule:NN \c xeCJK_left_tl #1
    \ xeCJK_select_punct_font:
    \xeCJK_fallback_punct_symbol:NN
    \CJKpunctsymbol #1
  }
\cs_new_protected:Npn \ xeCJK_CJK_and_FullLeft_glue:N #1
  {
    \CJKglue
    \ xeCJK_punct_glue:NN \c xeCJK_left_tl #1
  }
```

\xeCJK_Boundary_and_FullLeft:N
```
\cs_new_protected:Npn \xeCJK_Boundary_and_FullLeft:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #1
    \ xeCJK_Boundary_and_FullLeft_glue:N #1
    \xeCJK_class_group_begin:
    \xeCJK_select_punct_font:
    \xeCJK_clear_Boundary_and_CJK_toks:
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \ xeCJK_punct_rule:NN \c xeCJK_left_tl #1
    \xeCJK_fallback_punct_symbol:NN
    \CJKpunctsymbol #1
  }
```

\xeCJK_Boundary_and_FullLeft_ glue:N according to the value of \etex_lastnodetype:D for separate processing.

```
\cs_new_protected:Npn \ xeCJK_Boundary_and_FullLeft_glue:N #1
  {
    \tl_set_eq:NN \l xeCJK_alignii_tl \c xeCJK_left_tl
    \group_begin: \exp_args:NNc \group_end: \cs_if_exist_use:NTF
      { xeCJK_bound_type_ \int_use:N \tex_lastnodetype:D _glue:Nn }
      {#1}
      { \use:n }
      { \ xeCJK_punct_glue:NN \c xeCJK_left_tl #1 }
  }
\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.

```
\cs_new_protected:cpn { xeCJK_bound_type_ -1 _glue:Nn } #1#2
  { \ 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 \parindent width at the beginning of the paragraph for indentation.

```
\cs_new_protected:cpn { xeCJK_bound_type_ 1 _glue:Nn } #1
  {
    \int_do_while:nNnn \tex_lastnodetype:D = \c xeCJK_hlist_node
      { \ xeCJK_bound_hbox_auxi: }
    \ xeCJK_if_last_none:TF
      {
        \dim_case:nnF { \box_wd:N \l xeCJK_indent_box }
          {
            { \tex_parindent:D } { \ xeCJK_bound_hbox_auxii:nn }
            { \c_zero_dim }      { \use_i:nn }
          }
          { \use:nn }
      }
      { \use:nn }
      { \hbox_unpack_drop:N \l xeCJK_indent_box }
  }
\cs_new_protected:Npn \ xeCJK_bound_hbox_auxi:
  {
    \box_set_to_last:N \l xeCJK_tmp_box
    \hbox_set:Nn \l xeCJK_indent_box
      {
        \box_use:N \l xeCJK_tmp_box
        \hbox_unpack:N \l xeCJK_indent_box
      }
  }
\cs_new_protected:Npn \ xeCJK_bound_hbox_auxii:nn
  {
    \dim_compare:nNnTF
      { \box_ht:N \l xeCJK_tmp_box } = \c_zero_dim
      { \use_i:nn }
      { \use:nn }
  }
\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 used in the description environment (\ enit@postlabel@i) where the one that plays an influential role is \penalty\z@ \hskip\labelsep.

```
\cs_new_protected:cpn { xeCJK_bound_type_ 11 _glue:Nn } #1#2
  {
    \skip_if_finite:nTF { \tex_lastskip:D }
      { \ xeCJK_bound_glue_auxi:Nn #1 {#2} }
      { \ xeCJK_zero_glue: }
  }
\cs_new_protected:Npn \ xeCJK_bound_glue_auxi:Nn #1#2
  {
    \ xeCJK_if_last_punct_glue:TF
      { \xeCJK_punct_bound_kern:N #1 }
      { \ xeCJK_bound_glue_auxii:n {#2} }
  }
\cs_new_protected:Npn \ xeCJK_bound_glue_auxii:n #1
  {
    \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
    \skip_if_eq:NNTF { \l xeCJK_last_skip } { 1sp }
    { \ xeCJK_zero_glue: }
      {
        \skip_if_eq:nnTF { \l xeCJK_last_skip } { \labelsep }
          {
            \tex_unskip:D
            \ xeCJK_if_last_penalty:TF
              {
                \int_compare:nNnTF \tex_lastpenalty:D = \c_zero_int
                  { \skip_horizontal:N \l xeCJK_last_skip }
                  { \skip_horizontal:N \l xeCJK_last_skip #1 }
              }
              { \skip_horizontal:N \l xeCJK_last_skip #1 }
          }
          {#1}
      }
  }
```

\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.

```
\cs_new_protected:cpn { xeCJK_bound_type_ 12 _glue:Nn } #1#2
  {
    \xeCJK_if_last_node:nF { CJK }
      { \xeCJK_if_last_node:nF { CJK-space } { \use_none:nn } }
    \xeCJK_remove_node: \CJKglue
    #2
  }
```

\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.

```
\cs_new_protected:cpn { xeCJK_bound_type_ 13 _glue:Nn } #1#2
  {
    \ xeCJK_if_last_punct_penalty:TF
      { \xeCJK_punct_bound_kern:N #1 }
      {
        \int_compare:nNnTF \tex_lastpenalty:D = \c_zero_int
          {
            \tex_unpenalty:D
            \ 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
\ xeCJK_Default_and_FullRight_glue:N

```
1710  \cs_new_protected:Npn \ xeCJK_CJK_and_FullRight_glue:N #1
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
```
\cs_new_protected:Npn \xeCJK_FullLeft_and_FullLeft:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #1
    \xeCJK_get_punct_kerning:oN \g xeCJK_last_punct_tl #1
    \ xeCJK_punct_kern:NN \g xeCJK_last_punct_tl #1
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \xeCJK_fallback_punct_symbol:NN
    \CJKpunctsymbol #1
  }
```
\xeCJK_FullLeft_and_FullRight:N
```
\cs_new_protected:Npn \xeCJK_FullLeft_and_FullRight:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_right_tl #1
    \xeCJK_get_punct_kerning:oN \g xeCJK_last_punct_tl #1
    \ xeCJK_punct_kern:NN \g xeCJK_last_punct_tl #1
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \xeCJK_FullRight_symbol:N #1
  }
```
\xeCJK_FullRight_and_FullLeft:N
```
\cs_new_protected:Npn \xeCJK_FullRight_and_FullLeft:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_left_tl #1
    \xeCJK_get_punct_kerning:oN \g xeCJK_last_punct_tl #1
    \xeCJK_punct_kern:NN \g xeCJK_last_punct_tl #1
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \xeCJK_fallback_punct_symbol:NN
    \CJKpunctsymbol #1
  }
```
\xeCJK_FullRight_and_FullRight:N
```
\cs_new_protected:Npn \xeCJK_FullRight_and_FullRight:N #1
  {
    \xeCJK_get_punct_bounds:NN \c xeCJK_right_tl #1
    \xeCJK_get_punct_kerning:oN \g xeCJK_last_punct_tl #1
    \ xeCJK_punct_kern:NN \g xeCJK_last_punct_tl #1
    \tl_gset:Nn \g xeCJK_last_punct_tl {#1}
    \xeCJK_FullRight_symbol:N #1
  }
```

5.7 Line break after full-corner right punctuation

The CheckFullRight option is set.

```
\keys_define:nn { xeCJK / options }
  {
    CheckFullRight .choice: ,
    CheckFullRight / true .code:n =
      {
        \cs_if_eq:NNF \xeCJK_FullRight_and_Boundary: \xeCJK_check_FullRight:
          {
            \cs_set_eq:NN \ xeCJK_save_FullRight_check:
                          \xeCJK_FullRight_and_Boundary:
            \cs_set_eq:NN \ xeCJK_save_FullRight_symbol:N
                          \xeCJK_FullRight_symbol:N
            \cs_set_eq:NN \xeCJK_FullRight_and_Boundary:
                          \xeCJK_check_FullRight:
            \cs_set_eq:NN \xeCJK_FullRight_symbol:N
                          \xeCJK_check_FullRight_symbol:Nw
          }
      } ,
    CheckFullRight / false .code:n =
      {
        \cs_if_eq:NNT \xeCJK_FullRight_and_Boundary:
\xeCJK_check_FullRight:
          {
            \cs_set_eq:NN \xeCJK_FullRight_and_Boundary:
                          \ xeCJK_save_FullRight_check:
            \cs_set_eq:NN \xeCJK_FullRight_symbol:N
                          \ xeCJK_save_FullRight_symbol:N
```

```
            }
        } ,
      CheckFullRight          .default:n = { true }
    }
\xeCJK_FullRight_symbol:N \cs_new_protected:Npn \xeCJK_FullRight_symbol:N
    {
      \xeCJK_fallback_punct_symbol:NN
      \CJKpunctsymbol
    }
\xeCJK_check_FullRight: \cs_new_protected:Npn \xeCJK_check_FullRight:
    {
      \xeCJK_get_punct_bounds:No \c xeCJK_right_tl \g xeCJK_last_punct_tl
      \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
      \group_align_safe_begin:
      \token_case_meaning:NoTF
      \l_peek_token                { \l
      xeCJK_no_break_cs_case_tl } {                {
          \group_align_safe_end:
          \xeCJK_no_break:
          \group_insert_after:N \xeCJK_no_break:
        }
        { \group_align_safe_end: }
      \exp_after:wN \xeCJK_punct_node:N \g xeCJK_last_punct_tl
      \xeCJK_class_group_end:
      \ xeCJK_punct_glue:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl
    }
\prg_generate_conditional_variant:Nnn \token_case_meaning:Nn { No } { TF , F }
\xeCJK_check_FullRight_symbol:Nw \cs_new_protected:Npn \xeCJK_check_FullRight_symbol:Nw #1
    { \peek_remove_spaces:n { \ xeCJK_save_FullRight_symbol:N #1 } }
\xeCJK_cs_case_keys_define:nNNnn \cs_new_protected:Npn \xeCJK_cs_case_keys_define:nNNnn #1#2#3#4#5
    {
      \tl_new:N #2
      \seq_new:N #3
      \keys_define:nn { xeCJK / options }
        {
          #1 .code:n =
            {
              \seq_set_split:Nnn #3 { } {##1}
              \ xeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
            } ,
          #1+ .code:n =
            {
              \tl_map_inline:nn {##1}
                { \seq_if_in:NnF #3 {####1} { \seq_put_right:Nn #3 {####1} } }
              \ xeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
            } ,
          #1- .code:n =
            {
              \tl_map_inline:nn {##1} { \seq_remove_all:Nn #3 {####1} }
              \ xeCJK_update_cs_case_tl:NNnn #2#3 {#4} {#5}
            }
        }
    }
\cs_new_protected:Npn \ xeCJK_update_cs_case_tl:NNnn #1#2#3#4
    {
      \tl_clear:N #1
      \seq_map_inline:Nn #2 { \tl_put_right:Nn #1 { {  ###1} { #3} } }
      #4
    }
```

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

```
\xeCJK_cs_case_keys_define:nNNnn { NoBreakCS }
    \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.

```
\NewDocumentCommand \xeCJKnobreak { }
  {
    \bool_set_true:N \l xeCJK_tmp_bool
    \int_while_do:nNnn \tex_lastnodetype:D = \c xeCJK_glue_node
      {
        \bool_if:NTF \l xeCJK_tmp_bool
          {
            \bool_set_false:N \l xeCJK_tmp_bool
            \skip_set_eq:NN \l xeCJK_last_skip \tex_lastskip:D
          }
          { \skip_add:Nn \l xeCJK_last_skip \tex_lastskip:D }
        \tex_unskip:D
      }
    \xeCJK_if_last_node:TF
      {
        \dim_set_eq:NN \l xeCJK_tmp_dim \l xeCJK_last_kern_dim
        \xeCJK_if_last_node:TF
          {
            \ xeCJK_if_last_glue:TF
              {
                \exp_args:NNNo \tex_unskip:D \xeCJK_no_break:
                \skip_horizontal:n { \skip_use:N \tex_lastskip:D }
              }
            \ xeCJK_make_node:N \l xeCJK_last_kern_dim
          }
          { }
        \ xeCJK_make_node:N \l xeCJK_tmp_dim
      }
      { }
    \xeCJK_no_break:
    \bool_if:NF \l xeCJK_tmp_bool
      { \skip_horizontal:N \l xeCJK_last_skip }
  }
```

5.8 End-of-paragraph orphan word processing

CheckSingle The orphan word processing function option.

```
\keys_define:nn { xeCJK / options }
  {
    CheckSingle .choice: ,
    CheckSingle / true .code:n =
      {
        \cs_if_eq:NNF \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
          {
            \cs_set_eq:NN \ xeCJK_check_single_save:N \xeCJK_CJK_and_CJK:N
            \cs_set_eq:NN \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
          }
      } ,
    CheckSingle / false .code:n =
      {
        \cs_if_eq:NNT \xeCJK_CJK_and_CJK:N \xeCJK_check_single:Nw
          { \cs_set_eq:NN \xeCJK_CJK_and_CJK:N \xeCJK_check_single_save:N }
      } ,
    CheckSingle       .default:n = { true } ,
    CJKchecksingle          .meta:n = { CheckSingle = true }
  }
```

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

```
\keys_define:nn { xeCJK / options }
  {
    WidowPenalty .int_set:N = \l xeCJK_widow_penalty_int ,
    WidowPenalty .default:n = { 10 000 }
  }
```

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

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

\xeCJK_check_single:Nw
\ xeCJK_check_single_end:N

```
\cs_new_protected:Npn \xeCJK_check_single:Nw #1
  {
    \group_align_safe_begin:
    \peek_catcode:NTF \c_catcode_letter_token
      { \xeCJK_check_single:NNw #1 }
      {
        \token_if_other:NTF \l_peek_token
          { \xeCJK_check_single:NNw }
          { \ xeCJK_check_single_end:N }
        #1
      }
  }
\cs_new_protected:Npn \ xeCJK_check_single_end:N
  {
    \group_align_safe_end:
    \ xeCJK_check_single_save:N
  }
```

\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

```
\cs_new_protected:Npn \xeCJK_check_single:NNNw #1#2
  {
    \xeCJK_peek_catcode_ignore_spaces:NTF \c_catcode_letter_token
      {
        \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
          {
            \bool_if:NTF \l xeCJK_reserve_space_bool
              { \ xeCJK_check_single_end:N #1 #2 ~ }
              { \ xeCJK_check_single_space:NN #1#2 }
          }
          { \ xeCJK_check_single_end:N #1 #2 }
      }
      {
        \token_if_other:NTF \l_peek_token
          {
            \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
              { \ xeCJK_check_single_space:NN }
              { \ xeCJK_check_single_end:N }
          }
          {
            \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
              { \ xeCJK_check_single_aux:nNNw { ~ } }
              { \ xeCJK_check_single_aux:nNNw { } }
          }
        #1 #2
      }
  }
\cs_new_protected:Npn \ xeCJK_check_single_aux:nNNw #1#2#3
  {
    \token_if_cs:NTF \l_peek_token
      { \xeCJK_check_single_cs:NNn }
      { \xeCJK_check_single_end:NNnw }
    #2 #3 {#1}
  }
```

\xeCJK_check_single_ end:NNnw
\ xeCJK_check_single_end_aux:NNn
\ xeCJK_check_single_end_equation:NNnw

```
\cs_new_protected:Npn \xeCJK_check_single_end_aux:NNn #1#2#3
  { \ xeCJK_check_single_end:N #1 #2 #3 }
\ cs_new_eq:NN \ xeCJK_check_single_end:NNnw \ xeCJK_check_single_end_aux:NNn
\cs_new_protected:Npn \ xeCJK_check_single_end_equation:NNnw
  {
    \token_if_math_toggle:NTF \l_peek_token
      { \xeCJK_check_single_equation:NNnNw }
      { \ xeCJK_check_single_end_aux:NNn }
  }
```

PlainEquation
```
\keys_define:nn { xeCJK / options }
  {
    PlainEquation .choice: ,
    PlainEquation / true .code:n =
      {
        \cs_set_eq:NN \xeCJK_check_single_end:NNnw
                      \ xeCJK_check_single_end_equation:NNnw
      } ,
    PlainEquation / false .code:n =
      {
        \cs_set_eq:NN \xeCJK_check_single_end:NNnw
                      \ xeCJK_check_single_end_aux:NNn
      } ,
    PlainEquation       .default:n = { true } ,
  }
```

\ xeCJK_check_single_ space:NN
```
\cs_new_protected:Npn \ xeCJK_check_single_space:NN #1#2
  {
    \xeCJK_if_CJK_class:NTF #2
      {
        \xeCJK_if_CJK_class:NTF \l_peek_token
          { \ xeCJK_check_single_end:N #1 #2 }
          { \ xeCJK_check_single_end:N #1 #2 ~ }
      }
      { \ xeCJK_check_single_end:N #1 #2 ~ }
  }
```

\xeCJK_check_single_equation:NNnNw
```
\cs_new_protected:Npn \xeCJK_check_single_equation:NNnNw #1#2#3#4
  {
    \peek_catcode:NTF \c_math_toggle_token
      {
        \xeCJK_widow_penalty: \ xeCJK_check_single_end:N #1
        \xeCJK_make_node:n { CJK-widow } #2 #4
      }
      { \ xeCJK_check_single_end:N #1 #2#3#4 }
  }
```

\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
l.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.

```
\cs_new_protected:Npn \xeCJK_check_single_cs:NNn #1#2#3
  {
    \token_case_meaning:NoF \l_peek_token
      { \l xeCJK_check_single_cs_case_tl }
      { \use_iii:nnn }
      { \xeCJK_check_single_env:nnNn }
      {
        \xeCJK_widow_penalty:
        \ xeCJK_check_single_end:N #1
        \xeCJK_make_node:n { CJK-widow } #2#      3
      }
      { \ xeCJK_check_single_end:N #1 #2#3 }
  }
\tl_new:N \l xeCJK_check_single_cs_case_tl
```

\xeCJK_check_single_env:nnNn
```
\cs_new_protected:Npn \xeCJK_check_single_env:nnNn #1#2#3#4
  {
    \str_case_e:noTF {#4}
      { \l xeCJK_inline_env_case_tl }
```

```
        {#2}
        {#1}
      #3 {#4}
  }
\prg_generate_conditional_variant:Nnn \str_case_e:nn { no } { TF }
```

NewLineCS
```
\xeCJK_cs_case_keys_define:nNNnn { NewLineCS }
  \l xeCJK_new_line_cs_case_tl \l xeCJK_new_line_cs_seq
  { \use_ii:nnn }
  {
    \tl_concat:NNN \l xeCJK_check_single_cs_case_tl
      \l xeCJK_new_line_cs_case_tl \l xeCJK_env_cs_case_tl
  }
```

EnvCS
```
\xeCJK_cs_case_keys_define:nNNnn { EnvCS }
  \l xeCJK_env_cs_case_tl \l xeCJK_env_cs_seq
  { \use:n }
  {
    \tl_concat:NNN \l xeCJK_check_single_cs_case_tl
      \l xeCJK_new_line_cs_case_tl \l xeCJK_env_cs_case_tl
  }
```

InlineEnv
```
\keys_define:nn { xeCJK / options }
  {
    InlineEnv          .code:n =
      {
        \seq_set_from_clist:Nn \l xeCJK_inline_env_seq {#1}
        \ xeCJK_update_inline_env_case_tl:
      } ,
    InlineEnv+         .code:n =
      {
        \clist_map_inline:nn {#1}
          {
            \seq_if_in:NnF \l xeCJK_inline_env_seq {##1}
              { \seq_put_right:Nn \l xeCJK_inline_env_seq {##1} }
          }
        \ xeCJK_update_inline_env_case_tl:
      } ,
    InlineEnv-         .code:n =
      {
        \clist_map_inline:nn {#1}
          { \seq_remove_all:Nn \l xeCJK_inline_env_seq {##1} }
        \ xeCJK_update_inline_env_case_tl:
      }
  }
\seq_new:N \l xeCJK_inline_env_seq
```

_xeCJK_update_inline_env_case_tl:
```
\cs_new_protected:Npn \ xeCJK_update_inline_env_case_tl:
  {
    \tl_clear:N \l xeCJK_inline_env_case_tl
    \seq_map_inline:Nn \l xeCJK_inline_env_seq
      { \tl_put_right:Nn \l xeCJK_inline_env_case_tl { {##1} { } }
  }
\tl_new:N \l xeCJK_inline_env_case_tl
```

5.9 Add CJK sub-partition

\g_xeCJK_CJK_sub_class_seq
```
\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.
```
\NewDocumentCommand \xeCJKDeclareSubCJKBlock
  { s > { \TrimSpaces } m m }
  {
    \xeCJK_declare_sub_char_class:nen { CJK } {#2} {#3}
    \IfBooleanT {#1} { \xeCJKResetPunctClass }
  }
\@onlypreamble \xeCJKDeclareSubCJKBlock
```

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

```
\bool_new:N \l xeCJK_sub_cancel_bool
\NewDocumentCommand \xeCJKCancelSubCJKBlock { s m }
  {
    \bool_if:NF \l xeCJK_sub_cancel_bool
      {
        \bool_set_true:N \l xeCJK_sub_cancel_bool
        \ xeCJK_sub_restore_or_cancel:e {#2}
        \IfBooleanT {#1} { \xeCJKResetPunctClass }
      }
  }
\NewDocumentCommand \xeCJKRestoreSubCJKBlock { s m }
  {
    \bool_if:NT \l xeCJK_sub_cancel_bool
      {
        \bool_set_false:N \l xeCJK_sub_cancel_bool
        \ xeCJK_sub_restore_or_cancel:e {#2}
        \IfBooleanT {#1} { \xeCJKResetPunctClass }
      }
  }
```

\ xeCJK_sub_restore_or_ cancel:n

```
\cs_new_protected:Npn \ xeCJK_sub_restore_or_cancel:n #1
  {
    \clist_map_inline:nn {#1}
      {
        \int_if_exist:cTF { \ xeCJK_class_csname:n { CJK/##1 } }
          {
            \xeCJK_declare_char_class:nn
              { CJK \bool_if:NF \l xeCJK_sub_cancel_bool { /##1 } }
              { \use:c { g xeCJK_CJK/##1_range_clist } }
          }
          { \ xeCJK_error:nx { SubBlock-undefined } {##1} }
      }
  }
\cs_generate_variant:Nn \ xeCJK_sub_restore_or_cancel:n { e }
\ xeCJK_msg_new:nn { SubBlock-undefined }
  {
    The~CJK~sub~block~`#1'~is~undefined.\\\\
    Try~to~use~\token_to_str:N \xeCJKDeclareSubCJKBlock\
    to~declare~it.
  }
```

\xeCJK_declare_sub_char_class:nnn

```
\cs_new_protected:Npn \xeCJK_declare_sub_char_class:nnn #1#2#3
  {
    \int_if_exist:cF { \ xeCJK_class_csname:n { #1/#2 } }
      {
        \xeCJK_new_class:n { #1/#2 }
        \ xeCJK_set_sub_class_toks:nn {#1} {#2}
        \xeCJK_new_sub_key:n {#2}
      }
    \xeCJK_declare_char_class:nn { #1/#2 } {#3}
  }
\cs_generate_variant:Nn \xeCJK_declare_sub_char_class:nnn { ne }
```

\ xeCJK_set_sub_class_ toks:nn

```
\cs_new_protected:Npn \ xeCJK_set_sub_class_toks:nn #1#2
  {
    \seq_map_inline:Nn \g xeCJK_base_class_seq
      {
        \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } {##1} {#1} {##1}
        \xeCJK_copy_inter_class_toks:nnnn {##1} { #1/#2 } {##1} {#1}
        \str_if_eq:nnTF {##1} { CJK }
          {
            \xeCJK_pre_inter_class_toks:nnn {##1} { #1/#2 }
              { \ xeCJK_switch_font:nn {#1} {#2} }
          }
          {
            \xeCJK_replace_inter_class_toks:nnnn {##1} { #1/#2 }
              { \xeCJK_fallback_symbol:NN }
```

```
                {
                  \ xeCJK_switch_font:nn {#1} {#2}
                  \xeCJK_fallback_symbol:NN
                }
            }
        }
      \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } { #1/#2 } {#1} {#1}
      \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
        {
          \xeCJK_copy_inter_class_toks:nnnn { #1/#2 } { #1/##1 } {#1} {#1}
          \xeCJK_copy_inter_class_toks:nnnn { #1/##1 } { #1/#2 } {#1} {#1}
          \xeCJK_pre_inter_class_toks:nnn { #1/#2 } { #1/##1 }
            { \ xeCJK_switch_font:nn {#2} {##1} }
          \xeCJK_pre_inter_class_toks:nnn { #1/##1 } { #1/#2 }
            { \ xeCJK_switch_font:nn {##1} {#2} }
        }
      \seq_gput_right:Nn \g xeCJK_CJK_sub_class_seq {#2}
      \ xeCJK_save_CJK_class:n { #1/#2 }
      \clist_map_inline:nn { CJK , FullLeft , FullRight , HangulJamo }
        {
          \xeCJK_pre_inter_class_toks:nnn { #1/#2 } {##1}
            { \ xeCJK_switch_font:nn {#2} {#1} }
        }
  }
```

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.

```
\cs_if_exist:NF \tex_XeTeXglyphbounds:D
  {
    \ xeCJK_msg_new:nn { XeTeX-too-old }
      {
        \token_to_str:N \tex_XeTeXglyphbounds:D \ is~not~defined.\
        CJK~punctuation~kerning~will~not~be~available.\\\\
        You~have~to~update~XeTeX~to~the~version~0.9995.0~or~later.
      }
    \ xeCJK_error:n { XeTeX-too-old }
    \AtEndOfPackage
      {
        \keys_define:nn { xeCJK / options }
          {
            PunctStyle .code:n =
              { \ xeCJK_error:nx { punct-style-unknown } {#1} }
          }
        \seq_gclear:N \g xeCJK_punct_style_seq
        \ xeCJK_set_punct_style:n { plain }    }
  }
```

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

```
\NewDocumentCommand \xeCJKsetwidth { s m m }
  {
    \IfBooleanTF {#1}
      {
        \tl_map_inline:en {#2}
          { \tl_gset:cn { g xeCJK_punct_bound_width/##1/tl } {#3} }
      }
      {
        \tl_map_inline:en {#2}
          { \tl_gset:cn { g xeCJK_punct_width/##1/tl } {#3} }
      }
  }
\@onlypreamble \xeCJKsetwidth
\cs_generate_variant:Nn \tl_map_inline:nn { e }
```

\xeCJKsetkern Set the distance of adjacent markers manually.

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

\c xeCJK_left_ tl `\tl_const:Nn \c xeCJK_left_tl { left }`
\c xeCJK_right_tl `\tl_const:Nn \c xeCJK_right_tl { right }`

AllowBreakBetweenPuncts related option statement.
KaiMingPunct
LongPunct
MiddlePunct
PunctWidth
PunctBoundWidth
RubberPunctSkip

```
\keys_define:nn { xeCJK / options }
  {
    AllowBreakBetweenPuncts .choice: ,
    AllowBreakBetweenPuncts / true .code:n =
      {
        \bool_set_true:N \l xeCJK_punct_breakable_bool
        \cs_set_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_breakable_kern:NN
        \cs_set_eq:NN \ xeCJK_punct_bound_kern:N
                      \ xeCJK_punct_bound_breakable_kern:N
      } ,
    AllowBreakBetweenPuncts / false .code:n =
      {
        \bool_set_false:N \l xeCJK_punct_breakable_bool
        \cs_set_eq:NN \xeCJK_punct_kern:NN \xeCJK_punct_kern:NN
        \cs_set_eq:NN \ xeCJK_punct_bound_kern:N
                      \ xeCJK_nobreak_hskip:N
      } ,
    AllowBreakBetweenPuncts      .default:n = { true } ,
      KaiMingPunct .code:n = {   \ xeCJK_set_special_punct:nn   { mixed_width }  {#1} } ,
     KaiMingPunct+ .code:n = {   \ xeCJK_add_special_punct:nn   { mixed_width }  {#1} } ,
     KaiMingPunct- .code:n = {   \ xeCJK_sub_special_punct:nn   { mixed_width }  {#1} } ,
    LongPunct     .code:n = {   \ xeCJK_set_special_punct:nn   { long } {#1} }   ,
    LongPunct+    .code:n = {   \ xeCJK_add_special_punct:nn   { long } {#1} }   ,
    LongPunct-    .code:n = {   \ xeCJK_sub_special_punct:nn   { long } {#1} }   ,
    MiddlePunct   .code:n = {   \ xeCJK_set_special_punct:nn   { middle } {#1}  } ,
      MiddlePunct+ .code:n = {  \ xeCJK_add_special_punct:nn   { middle } {#1}  } ,
      MiddlePunct- .code:n = {  \ xeCJK_sub_special_punct:nn   { middle } {#1}  } ,
    PunctWidth      .tl_gset:N = \g xeCJK_punct_width_tl ,
    PunctBoundWidth .tl_gset:N = \g xeCJK_punct_bound_width_tl ,
    PunctWidth      .value_required:n = true ,
    PunctBoundWidth .value_required:n = true ,
    RubberPunctSkip .choice: ,
    RubberPunctSkip      .default:n = { true } ,
    RubberPunctSkip / true .code:n =
      { \cs_set_eq:NN \ xeCJK_use_dim_or_skip:nNN \ xeCJK_use_punct_skip:nNN } ,
    RubberPunctSkip / plus .code:n =
      { \cs_set_eq:NN \ xeCJK_use_dim_or_skip:nNN \ xeCJK_use_punct_skip_plus:nNN } ,
    RubberPunctSkip / minus .code:n =
      { \cs_set_eq:NN \ xeCJK_use_dim_or_skip:nNN \ xeCJK_use_punct_skip_minus:nNN } ,
    RubberPunctSkip / false .code:n =
      { \cs_set_eq:NN \ xeCJK_use_dim_or_skip:nNN \ xeCJK_use_punct_dim:nNN }
  }
\bool_new:N \l xeCJK_punct_breakable_bool
```

The helper function defined by the associated option.

```
\clist_new:N \g xeCJK_special_punct_clist
\clist_gset:Nn \g xeCJK_special_punct_clist { mixed_width , long , middle }
\cs_new:Npn \ xeCJK_special_punct_seq:n #1 { g xeCJK_special_punct_#1_seq }
\cs_new:Npn \ xeCJK_special_punct_tl:nN #1#2 { g xeCJK_special_punct_#1_#2_tl }
\clist_map_inline:Nn \g xeCJK_special_punct_clist
  { \seq_new:c { \ xeCJK_special_punct_seq:n {#1} } }
\cs_new_protected:Npn \ xeCJK_set_special_punct:nn #1#2
  {
    \seq_map_inline:cn { \ xeCJK_special_punct_seq:n {#1} }
      { \cs_undefine:c { \ xeCJK_special_punct_tl:nN {#1} {##1} } }
    \seq_gclear:c { \ xeCJK_special_punct_seq:n {#1} }
```

```
      \tl_map_inline:en {#2}
        {
          \tl_new:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
          \seq_gput_right:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
        }
    }
\cs_new_protected:Npn \ xeCJK_add_special_punct:nn #1#2
    {
      \tl_map_inline:en {#2}
        {
          \seq_if_in:cnF { \ xeCJK_special_punct_seq:n {#1} } {##1}
            {
              \tl_new:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
              \seq_gput_right:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
            }
        }
    }
\cs_new_protected:Npn \ xeCJK_sub_special_punct:nn #1#2
    {
      \tl_map_inline:en {#2}
        {
          \cs_undefine:c { \ xeCJK_special_punct_tl:nN {#1} {##1} }
          \seq_gremove_all:cn { \ xeCJK_special_punct_seq:n {#1} } {##1}
        }
    }
```

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

```
\prg_new_conditional:Npnn \ xeCJK_punct_if_right:N #1 { p , T , F , TF }
    {
      \if_int_compare:w \xeCJK_token_value_class:N #1 =
                                \xeCJK_class_num:n { FullRight }
        \prg_return_true: \else: \prg_return_false: \fi:
}
\clist_map_inline:Nn \g xeCJK_special_punct_clist
    {
      \exp_args:Nc
      \prg_new_conditional:Npnn { xeCJK_punct_if_#1:N } ##1 { p , T , F , TF }
        {
          \if_cs_exist:w \ xeCJK_special_punct_tl:nN {#1} {##1} \cs_end:
            \prg_return_true: \else: \prg_return_false: \fi:
        }
    }
```

Some helper functions for logging.

```
\cs_new:Npn \ xeCJK_punct_csname:n #1
    { c xeCJK_\l_xeCJK_current_punct_font_tl/\l_xeCJK_punct_style_tl/#1/tl }
\cs_new:Npn \ xeCJK_use_punct_dim:nN #1#2
    { \use:c { \ xeCJK_punct_csname:n { dim/#1/#2 } }
\cs_new:Npn \ xeCJK_use_punct_dim:nNN #1#2#3
    { \use:c { \ xeCJK_punct_csname:n { dim/#1/#2/#3 } }
\cs_new:Npn \ xeCJK_use_punct_skip:nNN #1#2#3
    { \use:c { \ xeCJK_punct_csname:n { skip/#1/#2/#3 } }
\cs_new:Npn \ xeCJK_use_punct_skip_plus:nNN #1#2#3
    { \use:c { \ xeCJK_punct_csname:n { skip/plus/#1/#2/#3 } }
\cs_new:Npn \ xeCJK_use_punct_skip_minus:nNN #1#2#3
    { \use:c { \ xeCJK_punct_csname:n { skip/minus/#1/#2/#3 } }
\cs_new_protected:Npn \ xeCJK_save_punct_dim:nNn #1#2
    { \ xeCJK_save_punct_width_aux:nnnn { dim } {#1} { #1/#2 } }
\cs_new_protected:Npn \ xeCJK_save_punct_dim:nNNn #1#2#3
    { \ xeCJK_save_punct_width_aux:nnnn { dim } {#1} { #1/#2/#3 }
\cs_new_protected:Npn \ xeCJK_save_punct_skip:nNNn #1#2#3#4
    {
      \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { #1/#2/#3 } {#4}
      \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { plus/#1/#2/#3 } {#4}
      \ xeCJK_save_punct_width_aux:nnnn { skip } {#1} { minus/#1/#2/#3 } {#4}
}
```

```
\cs_new_protected:Npn \ xeCJK_save_punct_skip:nNNnnn #1#2#3#4#5#6
  {
    \exp_last_unbraced:Ne
    \ xeCJK_save_punct_skip_aux:nnnnnn
      {
        {#1}
        { #1/#2/#3 }
        { \dim_eval:n {#4} }
        { \dim_max:nn { \c_zero_dim } {#5} }
        { \dim_max:nn { \c_zero_dim } {#6} }
      }
  }
\cs_new_protected:Npn \ xeCJK_save_punct_skip_aux:nnnnnn #1#2#3#4#5
  {
    \ xeCJK_save_punct_width_aux:nnnn { skip } {#1}
      {#2}          { #3 ~ plus ~ #4 ~ minus ~ #5 ~ }
    \ xeCJK_save_punct_width_aux:nnnn { skip } {#1}
      { plus/#2 } { #3 ~ plus ~ #4 ~ }
    \ xeCJK_save_punct_width_aux:nnnn { skip } {#1}
      { minus/#2 } { #3 ~ minus ~ #5 ~ }
  }
\cs_new_protected:Npn \ xeCJK_save_punct_width_aux:nnnn #1#2#3#4
  {
    \ xeCJK_save_punct_width_aux:cen
      { \ xeCJK_punct_csname:n { #1/#3 } }
      { \use:c { #1_eval:n } {#4} }
      {#2}
  }
\cs_new_protected:Npn \ xeCJK_save_punct_width_aux:Nnn #1#2#3
  {
    \tl_const:Nn #1 {#2}
    \str_if_eq:nnT {#3} { glue }
      { \prop_gput:Nnn \g xeCJK_punct_skip_prop {#2} { } }
  }
\prop_new:N \g xeCJK_punct_skip_prop
\prop_gput:Non \g xeCJK_punct_skip_prop { \skip_use:N \c_zero_skip } { }
\cs_generate_variant:Nn \ xeCJK_save_punct_width_aux:Nnn { ce }
\cs_new_eq:NN \ xeCJK_use_dim_or_skip:nNN \ xeCJK_use_punct_skip:nNN
```

Define the punctuation processing template.

```
\DeclareObjectType { xeCJK / punctuation } { 0 }
\DeclareTemplateInterface { xeCJK / punctuation } { basic } { 0 }
  {
    enabled-global-setting : boolean = true ,
    fixed-punct-width      : length = \c_max_dim ,
    fixed-punct-ratio      : real   = \c_one_fp ,
    mixed-punct-width      : length = \KeyValue { fixed-punct-width } ,
    mixed-punct-ratio      : real = \KeyValue { fixed-punct-ratio } ,
    middle-punct-width     : length = \KeyValue { fixed-punct-width } ,
    middle-punct-ratio     : real = \KeyValue { fixed-punct-ratio } ,
    fixed-margin-width     : length = \c_max_dim ,
    fixed-margin-ratio     : real = \c_one_fp ,
    mixed-margin-width     : length = \KeyValue { fixed-margin-width } ,
    mixed-margin-ratio     : real = \KeyValue { fixed-margin-ratio } ,
    middle-margin-width    : length = \KeyValue { fixed-margin-width } ,
    middle-margin-ratio    : real = \KeyValue { fixed-margin-ratio } ,
    bound-punct-width      : length = \c_max_dim ,
    bound-punct-ratio      : real   = \c_nan_fp ,
    bound-margin-width     : length = \c_max_dim ,
                                    =
                                    s
                                    y
                                    n
                                    c,
                                    c                ,
                                    o
                                    rr
```

```
    kerning-total-width       : length  = \c_max_dim ,
    kerning-total-ratio       : real    = 0.75 ,
    optimize-kerning          : boolean = false ,
                                =
                                s
                                y
                                n
                                c,
                                c
                                o
                                rr
                                e
                                ct
                                e
                                d
                                b
                                y
                                el
                                d
                                e
                                r
                                m
                                a
                                n
                                =
                                =
    same-align-margin         : length  = \c_max_dim ,
    same-align-ratio          : real    = \c_nan_fp ,
       different-align-margin : length  = \c_max_dim ,
    different-align-ratio     : real    = \c_nan_fp ,
    kerning-margin-width      : length  = \c_max_dim ,
    kerning-margin-ratio      : real    = \c_one_fp ,
    kerning-margin-minimum : length = \c_zero_dim
  }
\DeclareTemplateCode { xeCJK / punctuation } { basic } { 0 }
  {
    enabled-global-setting  = \l xeCJK_enabled_global_setting_bool ,
    fixed-punct-width       = \l xeCJK_fixed_punct_width_dim ,
    fixed-punct-ratio       = \l xeCJK_fixed_punct_ratio_fp ,
    mixed-punct-width       = \l xeCJK_mixed_punct_width_dim ,
    mixed-punct-ratio       = \l xeCJK_mixed_punct_ratio_fp ,
    middle-punct-width      = \l xeCJK_middle_punct_width_dim ,
    middle-punct-ratio      = \l xeCJK_middle_punct_ratio_fp ,
    fixed-margin-width      = \l xeCJK_fixed_margin_width_dim ,
    fixed-margin-ratio      == \l xeCJK_fixed_margin_ratio_fp ,
                               sy
                               nc
                               ,
                               co
                               rr
                               ec
                               te
                               d
                               by
                               el
                               de
                               r
                               m
                               an
                               ==
    mixed-margin-width      == \l xeCJK_mixed_margin_width_dim ,
                               sy
                               nc
                               ,
                               co
                               rr
                               ec
                               te
                               d
                               by
                               el
                               de
                               r
                               m
```

```
                                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    {
```

2452 \ xeCJK_save_punct_dim:nNNn { glue } #1 #2 { \c_zero_dim }

```
      \ xeCJK_save_punct_dim:nNNn { offset } #1 #2 { \c_zero_dim }
      \ xeCJK_save_punct_dim:nNNn { margin } #1 #2 { \c_zero_dim }
      \ xeCJK_save_punct_dim:nNNn { rule } \c xeCJK_left_tl {#2} { \c_zero_dim }
      \ xeCJK_save_punct_dim:nNNn { rule } \c xeCJK_right_tl {#2} { \c_zero_dim }
      \ xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_left_tl {#2} { \c_zero_dim }
      \ xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_right_tl {#2} { \c_zero_dim }
      \ xeCJK_save_punct_skip:nNNn { glue } #1 #2 { \c_zero_skip }
    }
\cs_new_protected:Npn \ xeCJK_save_punct_margin:NN #1#2
    {
      \group_begin:
        \xeCJK_select_punct_font:
        \xeCJK_fallback_punct_symbol:NN
        \xeCJK_calc_punct_dimen:N #2
      \group_end:
      \dim_set:Nn \l xeCJK_bound_dim
        { \ xeCJK_use_punct_dim:nNN { bound } #1 #2 }
      \tl_if_eq:NNTF #1 \c xeCJK_right_tl
        { \tl_set_eq:NN \l xeCJK_reverse_tl \c xeCJK_left_tl }
      { \tl_set_eq:NN \l xeCJK_reverse_tl \c xeCJK_right_tl }
\dim_set:Nn \l xeCJK_reverse_bound_dim
        { \ xeCJK_use_punct_dim:nNN { bound } \l xeCJK_reverse_tl #2 }
      \UseInstance { xeCJK / punctuation } { \l_xeCJK_punct_style_tl }
\xeCJK_punct_margin_process:NN #1 #2
      \xeCJK_punct_offset_process:NN #1 #2
      \ xeCJK_punct_if_long:NT #2
        { \ xeCJK_long_punct_kerning:N #2 }
    }
\tl_new:N \l xeCJK_reverse_tl
\dim_new:N \l xeCJK_bound_dim
\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.

```
\cs_new_protected:Npn \ xeCJK_long_punct_kerning:N #1
    {
      \dim_set:Nn \l xeCJK_tmp_dim
        {
          \dim_max:nn
            { \l xeCJK_bound_dim + \l xeCJK_reverse_bound_dim }
            { \c_zero_dim }
        }
      \ xeCJK_save_punct_dim:nNNn { bound_width } #1 #1 { \l xeCJK_tmp_dim }
      \dim_set:Nn \l xeCJK_tmp_dim
        {
          \str_case:nnTF {#1}
            { { ^^^^2025 } { } { ^^^^2026 } { }
            { \c_zero_dim }
            { -\l xeCJK_tmp_dim }
        }
      \ xeCJK_save_punct_dim:nNNn { kern } #1 #1 { \l xeCJK_tmp_dim }
      \ xeCJK_save_punct_skip:nNNn { kern } #1 #1 { \l xeCJK_tmp_dim }
      \dim_add:Nn \l xeCJK_tmp_dim
        { \dim_max:nn { \l xeCJK_bound_dim } { \c_zero_dim } }
      \ xeCJK_save_punct_dim:nNNn { bound_kern } #1 #1 { \l xeCJK_tmp_dim }
      \ xeCJK_save_punct_skip:nNNn { bound_kern } #1 #1 { \l xeCJK_tmp_dim }
}
```

\xeCJK_get_punct_kerning:NN punctuation compression.

```
\cs_new_protected:Npn \xeCJK_get_punct_kerning:NN #1#2
    {
      \tl_if_exist:cF { \ xeCJK_punct_csname:n { dim/kern/#1/#2 } }
        {
          \tl_if_eq:NNTF \l_xeCJK_punct_style_tl \c xeCJK_punct_style_plain_tl
            { \ 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 }
          \ 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
```

```
                    { \dim_min:nn { \l xeCJK_bound_dim } }
                    { \use:n }
                    { \ xeCJK_calc_margin_width:N #2 }
                }
            }
        }
      \ xeCJK_save_punct_dim:nNNn { margin } #1 #2 { \l xeCJK_margin_dim }
    }
\dim_new:N \l xeCJK_margin_dim

\ xeCJK_calc_punct_ width:N \cs_new:Npn \ xeCJK_calc_punct_width:N #1
    {
      \ xeCJK_punct_if_middle:NTF #1
        { \ xeCJK_punct_width_or_ratio:nN { middle }
        {
          \ xeCJK_punct_if_mixed_width:NTF #1
            { \ xeCJK_punct_width_or_ratio:nN { mixed } }
            { \  xeCJK_punct_width_or_ratio:nN { fixed } }
        }
        #1
}

\ xeCJK_calc_margin_ width:N \cs_new:Npn \ xeCJK_calc_margin_width:N #1
    {
      \ xeCJK_punct_if_middle:NTF #1
        {
          \dim_compare:nNnTF \l xeCJK_middle_margin_width_dim < \c_max_dim
            { \l xeCJK_middle_margin_width_dim }
            {
              \ xeCJK_dim_ratio:Nn \l xeCJK_middle_margin_ratio_fp
                { ( \l xeCJK_bound_dim + \l xeCJK_reverse_bound_dim ) / 2 }
            }
        }
        {
          \ xeCJK_punct_if_mixed_width:NTF #1
            { \ xeCJK_margin_width_or_ratio:n { mixed } }
            { \  xeCJK_margin_width_or_ratio:n { fixed } }
        }
}

    \ xeCJK_dim_ ratio:Nn \cs_new:Npn \ xeCJK_dim_ratio:Nn #1#2
      { \fp_to_dim:n { #1 \dim_to_fp:n { #2} } }
\cs_generate_variant:Nn \ xeCJK_dim_ratio:Nn { c }

\xeCJK_punct_offset_process:NN \cs_new_protected:Npn \xeCJK_punct_offset_process:NN #1#2
    {
      \dim_set:Nn \l xeCJK_tmp_dim
        {
          \bool_if:NTF \l xeCJK_enabled_global_setting_bool
            {
              \cs_if_exist_use:cF { g xeCJK_punct_bound_width/#2/tl }
                {
                  \tl_if_empty:NTF \g xeCJK_punct_bound_width_tl
                    { \ xeCJK_punct_width_or_ratio:nN { bound } #2 }
                    { \g xeCJK_punct_bound_width_tl }
                }
            }
            { \ xeCJK_punct_width_or_ratio:nN { bound } #2 }
        }
      \dim_set:Nn \l xeCJK_tmp_dim
        {
          \bool_if:NTF \l xeCJK_enabled_hanging_bool
            { \use:n }
            { \dim_max:nn { \l xeCJK_margin_minimum_dim } }
            {
              \dim_compare:nNnTF \l xeCJK_tmp_dim < \c_max_dim
                {
                  \ xeCJK_punct_if_middle:NTF #2
```

```
                    {
                      \l xeCJK_tmp_dim
                      - \l xeCJK_margin_dim
                      - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
                    }
                    {
                      \l xeCJK_tmp_dim
                      - \l xeCJK_reverse_bound_dim
                      - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
                    }
                }
                {
                  \bool_if:NTF \l xeCJK_optimize_margin_bool
                    { \dim_min:nn { \l xeCJK_bound_dim } }
                    { \use:n }
                    { \ xeCJK_margin_width_or_ratio:n { bound } }
                }
            }
        }
      \ xeCJK_save_punct_dim:nNNn { offset } #1 #2
        { \l xeCJK_tmp_dim }
      \ xeCJK_save_punct_dim:nNNn { rule } #1 #2
        { \l xeCJK_tmp_dim - \l xeCJK_bound_dim }
      \ xeCJK_save_punct_dim:nNNn { rule } \l xeCJK_reverse_tl #2
        { \l xeCJK_tmp_dim - \l xeCJK_reverse_bound_dim }
      \ xeCJK_save_punct_dim:nNNn { glue } #1 #2
        { \l xeCJK_margin_dim - \l xeCJK_tmp_dim }
      \ xeCJK_save_punct_skip:nNNnnn { glue } #1 #2
        { \l xeCJK_margin_dim - \l xeCJK_tmp_dim }
        {
          \ xeCJK_punct_if_middle:NTF #2
            {
              ( \ xeCJK_use_punct_dim:nN { width } #2 -
                \ xeCJK_use_punct_dim:nN { dimen } #2 ) / 2
              - \l xeCJK_margin_dim
            }
            { \l xeCJK_bound_dim - \l xeCJK_margin_dim }
        }
        {
          \ xeCJK_punct_if_middle:NTF #2
            { \l xeCJK_margin_dim / 2 }
            { \l xeCJK_margin_dim - \l xeCJK_reverse_bound_dim }
        }
    }

\_xeCJK_punct_width_or_ratio:nN \cs_new:Npn \ xeCJK_punct_width_or_ratio:nN #1#2
    {
      \dim_compare:nNnTF { \use:c { l xeCJK_#1_punct_width_dim } } < \c_max_dim
        { \use:c { l xeCJK_#1_punct_width_dim } }
        {
          \fp_if_nan:nTF { \use:c { l xeCJK_#1_punct_ratio_fp } }
            { \c_max_dim }
            {
              \ xeCJK_dim_ratio:cn
                { l xeCJK_#1_punct_ratio_fp }
                { \ xeCJK_use_punct_dim:nN { width } #2 }
            }
        }
    }

\_xeCJK_margin_width_or_ratio:n \cs_new:Npn \ xeCJK_margin_width_or_ratio:n #1
    {
      \dim_compare:nNnTF { \use:c { l xeCJK_#1_margin_width_dim } } < \c_max_dim
        { \use:c { l xeCJK_#1_margin_width_dim } }
        {
          \ xeCJK_dim_ratio:cn
            { 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) 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:nnnNNN #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 }
```

```
    \ xeCJK_save_punct_skip:nNNnnn {#1} #4 #5
      { \l xeCJK_tmp_dim }
      { \l xeCJK_margin_dim - \l xeCJK_kerning_margin_dim }
      { \l xeCJK_kerning_margin_dim - \l xeCJK_minimum_bound_dim }
  }
```

_xeCJK_original_kerning_ margin:NN The original margin width between two adjacent punctuation marks.

```
\cs_new:Npn \ xeCJK_original_kerning_margin:NN #1#2
  {
    \dim_eval:n
      {
        \ xeCJK_use_punct_dim:nNN
          { \ xeCJK_punct_if_right:NTF #1 { margin } { bound } } \c xeCJK_right_tl #1
        +
        \ xeCJK_use_punct_dim:nNN
          { \ xeCJK_punct_if_right:NTF #2 { bound } { margin } } \c xeCJK_left_tl #2
      }
  }
```

_xeCJK_calc_kerning_ margin:NN
_xeCJK_calc_kerning_margin_aux:NN

```
\cs_new:Npn \ xeCJK_calc_kerning_margin:NN #1#2
  {
    \dim_max:nn
      { \l xeCJK_kerning_margin_minimum_dim }
      {
        \bool_if:NTF \l xeCJK_min_bound_to_kerning_bool
          { \l xeCJK_minimum_bound_dim }
          {
            \bool_if:NTF \l xeCJK_optimize_kerning_bool
              { \dim_max:nn { \l xeCJK_minimum_bound_dim } }
              { \use:n }
              { \ xeCJK_calc_kerning_margin_aux:NN #1 #2 }
          }
      }
  }
\cs_new:Npn \ xeCJK_calc_kerning_margin_aux:NN #1#2
  {
    \dim_compare:nNnTF \l xeCJK_kerning_total_width_dim < \c_max_dim
      { \ xeCJK_calc_kerning_margin:nNN \l xeCJK_kerning_total_width_dim }
      {
        \fp_if_nan:nTF { \l xeCJK_kerning_total_ratio_fp }
          {
            \xeCJK_if_same_class:NNTF #1 #2
              { \ xeCJK_kerning_width_or_ratio:nNN { same }
              { \ xeCJK_kerning_width_or_ratio:nNN { different }
          }
          {
            \ xeCJK_calc_kerning_margin:nNN
              {
                \ xeCJK_dim_ratio:Nn \l xeCJK_kerning_total_ratio_fp
                  {
                    \ xeCJK_use_punct_dim:nN { width } #1 +
                    \ xeCJK_use_punct_dim:nN { width } #2
                  }
              }
          }
      }
      #1 #2
  }
```

_xeCJK_kerning_width_or_ ratio:nNN

```
\cs_new:Npn \ xeCJK_kerning_width_or_ratio:nNN #1#2#3
  {
    \dim_compare:nNnTF { \use:c { l xeCJK_#1_align_margin_dim } } < \c_max_dim
      { \use:c { l xeCJK_#1_align_margin_dim } }
      {
        \fp_if_nan:nTF { \use:c { l xeCJK_#1_align_ratio_fp } }
          {
            \dim_compare:nNnTF \l xeCJK_kerning_margin_width_dim < \c_max_dim
```

```
                { \l xeCJK_kerning_margin_width_dim \use_none:n }
                { \ xeCJK_dim_ratio:Nn \l xeCJK_kerning_margin_ratio_fp }
            }
            { \ xeCJK_dim_ratio:cn { l xeCJK_#1_align_ratio_fp } }
            { \l xeCJK_margin_dim }
        }
    }
\ xeCJK_punct_min_ bound:NN \cs_new:Npn \ xeCJK_punct_min_bound:NN #1#2
    {
      \dim_max:nn
        {
          \dim_min:nn
            { \ xeCJK_use_punct_dim:nNN { bound } \c
xeCJK_left_tl #1 } { \ xeCJK_use_punct_dim:nNN {
bound } \c xeCJK_right_tl #1 } }
        {
          \dim_min:nn
            { \ xeCJK_use_punct_dim:nNN { bound } \c
xeCJK_left_tl #2 } { \ xeCJK_use_punct_dim:nNN {
bound } \c xeCJK_right_tl #2 } }
    }
```

\ 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.

```
\cs_new:Npn \ xeCJK_calc_kerning_margin:nNN #1#2#3
    {
      \dim_eval:n
        {
          (#1)
        - ( \ xeCJK_use_punct_dim:nNN
              { \ xeCJK_punct_if_right:NTF #2 { bound } { margin }
              \c xeCJK_left_tl #2 )
        - ( \ xeCJK_use_punct_dim:nNN
              { \ xeCJK_punct_if_right:NTF #3 { margin } { bound }
              \c xeCJK_right_tl #3 )
        - ( \ xeCJK_use_punct_dim:nN { dimen } #2 )
        - ( \ xeCJK_use_punct_dim:nN { dimen } #3 )
        }
    }
```

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

```
\cs_new_protected:Npn \xeCJK_calc_punct_dimen:N #1
    {
      \ xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_left_tl #1
        { \xeCJK_glyph_bounds:NN 1 #1 }
      \ xeCJK_save_punct_dim:nNNn { bound } \c xeCJK_right_tl #1
        { \xeCJK_glyph_bounds:NN 3 #1 }
      \ xeCJK_save_punct_dim:nNn { width } #1
        { \tex_fontcharwd:D \tex_font:D `#1 }
      \ xeCJK_save_punct_dim:nNn { dimen } #1
        {
          ( \ xeCJK_use_punct_dim:nN { width } #1 )
          ( \ xeCJK_use_punct_dim:nNN { bound } \c
xeCJK_left_tl #1 ) - ( \
xeCJK_use_punct_dim:nNN { bound } \c xeCJK_right_tl #1 )
        }
    }
```

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

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

PunctStyle

```
\keys_define:nn { xeCJK / options }
    { PunctStyle .code:n = \exp_args:Nx \ xeCJK_set_punct_style:n {#1} }
\cs_new_protected:Npn \ xeCJK_set_punct_style:n #1
```

2889 {

```
    \IfInstanceExistTF { xeCJK / punctuation } {#1}
      { \tl_set:Nn \l_xeCJK_punct_style_tl {#1} }
      {
        \prop_get:NnNF \c xeCJK_punct_style_alias_prop
          {#1} \l_xeCJK_punct_style_tl
          { \ xeCJK_error:nx { punct-style-unknown } {#1} }
      }
  }
\prop_const_from_keyval:Nn \c xeCJK_punct_style_alias_prop
  {
    halfwidth       = banjiao ,
    fullwidth       = quanjiao ,
    mixedwidth      = kaiming ,
    marginkerning = hangmobanjiao ,
    plain           = plain
  }
\tl_new:N \l_xeCJK_punct_style_tl
\tl_const:Nn \c xeCJK_punct_style_plain_tl { plain }
\ xeCJK_msg_new:nn { punct-style-unknown }
  {
    Punctuation~style~"#1"~is~unknown. \\\\
    The~available~styles~are~listed~as~follow.\\\\
    "plain,~\seq_use:Nnnn \g xeCJK_punct_style_seq
      { ~and~ } { ,~ } { ,~and~ }". \\\\
  }
```

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

```
\cs_new_protected:Npn \ xeCJK_trim_spaces:n #1
  {
    \tl_set:Nx \ProcessedArgument
      { \exp_args:Ne \tl_trim_spaces:n {#1} }
  }
```

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

```
\NewDocumentCommand \xeCJKDeclarePunctStyle
  { > { \ xeCJK_trim_spaces:n } m m }
  {
    \IfInstanceExistTF { xeCJK / punctuation } {#1}
      { \ xeCJK_warning:nx { punct-style-already-defined } {#1} }
      { \seq_gput_right:Nn \g xeCJK_punct_style_seq {#1} }
    \DeclareInstance { xeCJK / punctuation } {#1} { basic } {#2}
  }
\seq_new:N \g xeCJK_punct_style_seq
\ xeCJK_msg_new:nn { punct-style-already-defined }
  {
    Punctuation~style~"#1"~is~already~defined! \\\\
    The~existing~style~of~"#1"~will~be~overwritten.\\
  }
\@onlypreamble \xeCJKDeclarePunctStyle
```

\xeCJKEditPunctStyle Modifications to existing punctuation handling styles.

```
\NewDocumentCommand \xeCJKEditPunctStyle
  { > { \ xeCJK_trim_spaces:n } m m }     {
    \IfInstanceExistTF { xeCJK / punctuation } {#1}
      { \EditInstance { xeCJK / punctuation } {#1} {#2} }
      { \ xeCJK_error:nx { punct-style-unknown } {#1} }
  }
\@onlypreamble \xeCJKEditPunctStyle
```

The default setting is the full-corner format.

```
\xeCJKDeclarePunctStyle { quanjiao } { }
\xeCJKDeclarePunctStyle { hangmobanjiao } { enabled-kerning = false }
```

```
\xeCJKDeclarePunctStyle { banjiao }
  {
    fixed-punct-ratio    =    0.5    ,
    optimize-margin        = true ,
    kerning-total-ratio   =   0.5   ,
    optimize-kerning = true
  }
\xeCJKDeclarePunctStyle { kaiming }
  {
    fixed-punct-ratio       = 0.5 ,
    mixed-punct-ratio      = 0.8 ,
    optimize-margin        = true ,
    kerning-total-ratio = 0.5 ,
    optimize-kerning       = true
  }
\xeCJKDeclarePunctStyle { CCT }
  {
    fixed-punct-ratio    =    0.7    ,
    optimize-margin        = true ,
    kerning-total-ratio   =   0.6   ,
    optimize-kerning = true
  }
```

5.11 Back-up fonts

Macro package option declaration for AutoFallBack back-up fonts.

```
\keys_define:nn { xeCJK / options }
  {
    AutoFallBack .voice: ,
    AutoFallBack / true .code:n =
      {
        \cs_set_eq:NN \xeCJK_fallback_symbol:NN
                      \ xeCJK_fallback_symbol:NN
        \cs_set_eq:NN \xeCJK_fallback_punct_symbol:NN
                      \ xeCJK_fallback_punct_symbol:NN
        \cs_set_eq:NN \xeCJK_clear_fallback_font:
                      \ xeCJK_clear_fallback_font:
      } ,
    AutoFallBack / false .code:n =
      {
        \xeCJK_cs_clear:N \xeCJK_fallback_symbol:NN
        \xeCJK_cs_clear:N \xeCJK_fallback_punct_symbol:NN
         \xeCJK_cs_clear:N \xeCJK_clear_fallback_font:
      } ,
    AutoFallBack        .default:n = { true } ,
    fallback                .meta:n = { AutoFallBack = true }
  }
```

\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

```
\cs_new_protected:Npn \ xeCJK_fallback_symbol:NN #1#2
  {
    \xeCJK_reset_fallback_font:
    \xeCJK_glyph_if_exist:NF #2
      { \ xeCJK_fallback_symbol_aux:NN }
    #1#2
  }
\cs_new_protected:Npn \ xeCJK_fallback_punct_symbol:NN #1#2
  {
    \xeCJK_reset_fallback_font:
    \xeCJK_glyph_if_exist:NF #2
      { \ xeCJK_fallback_punct_symbol_aux:NN }
    #1#2
  }
\cs_new_eq:NN \xeCJK_fallback_symbol:NN                \prg_do_nothing:
```

```
\cs_new_eq:NN \xeCJK_fallback_punct_symbol:NN \prg_do_nothing:
\cs_new_protected:Npn \ xeCJK_fallback_symbol_aux:NN
  {
    \ xeCJK_fallback_symbol_aux:nnNN
      { \CJK@family }
      { \l_xeCJK_family_tl }
  }
\cs_new_protected:Npn \ xeCJK_fallback_punct_symbol_aux:NN
  {
    \ xeCJK_fallback_symbol_aux:nnNN
      { \CJK@punctfamily }
      { \l_xeCJK_punct_family_tl }
  }
\cs_new_protected:Npn \ xeCJK_fallback_symbol_aux:nnNN
  {
    \cs_set_protected:Npx \xeCJK_reset_fallback_font:
      {
        \tex_the:D \tex_font:D
        \xeCJK_clear_fallback_font:
      }
    \exp_args:Nee \ xeCJK_fallback_loop:nnNN
  }
\cs_new_protected:Npn \ xeCJK_clear_fallback_font:
  { \cs_set_eq:NN \xeCJK_reset_fallback_font: \prg_do_nothing: }
\cs_new_eq:NN \xeCJK_reset_fallback_font: \prg_do_nothing:
\cs_new_eq:NN \xeCJK_clear_fallback_font: \prg_do_nothing:
```

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

```
\cs_new_protected:Npn \ xeCJK_fallback_loop:nnNN
  {
    \cs_set_eq:NN \ xeCJK_fallback_loop:TF \use_i:nn
    \ xeCJK_fallback_loop:nnnNNN { FallBack }
  }
\cs_new_protected:Npn \ xeCJK_fallback_loop:nnnNNN #1#2#3
  {
    \xeCJK_select_fallback_font:nnn {#1} {#2} {#3}
    \ xeCJK_fallback_loop:TF
      { \ xeCJK_fallback_loop_aux:nnnNNN }
      { \ xeCJK_fallback_missing_glyph:nnnNNN }
      {#1} {#2} {#3}
  }
\cs_new_protected:Npn \ xeCJK_fallback_loop_aux:nnnNNN #1#2#3#4#5
  {
    \xeCJK_glyph_if_exist:NF #5
      { \ xeCJK_fallback_loop:nnnNN { #1/FallBack } {#2} {#3} }
    #4#5
  }
\cs_new_protected:Npn \ xeCJK_fallback_missing_glyph:nnnNNN #1#2#3#4#5
  {
    \ xeCJK_warning:nxxx { missing-glyph } {#1} {#2} {#5}
    #4#5
  }
\cs_new_protected:Npn \xeCJK_select_fallback_font:nnn #1#2
  {
    \ xeCJK_select_fallback_font:cnnn
      { \ xeCJK_font_csname:n { #2/#1 } } {#1} {#2}
  }
\cs_new_protected:Npn \ xeCJK_select_fallback_font:Nnnn #1
  {
    \cs_if_exist:NF #1
      { \ xeCJK_fallback_font_initial:NNnnn }
    #1 \use_none:nnn
  }
\cs_generate_variant:Nn \ xeCJK_select_fallback_font:Nnnn { c }
\cs_new_protected:Npn \ xeCJK_fallback_font_initial:NNnnn #1#2#3#4#5
```

```
    {
      \xeCJK_family_if_exist:nTF { #5/#3 }
        { \ xeCJK_font_initial:Nn #1 { #5/#3 } }
        { \ xeCJK_fallback_font_initial_auxi:Nnnn #1 {#5} {#3} {#4} }
      #1
    }
\cs_new_protected:Npn \ xeCJK_fallback_font_initial_auxi:Nnnn #1
    {
      \exp_args:NNe \ xeCJK_fallback_font_initial_auxii:Nnnnn
        #1 { \CJKfamilydefault }
    }
\cs_new_protected:Npn \ xeCJK_fallback_font_initial_auxii:Nnnnn #1#2#3
    {
      \str_if_eq:nnTF {#2} {#3}
        { \ xeCJK_fallback_loop_end:Nnnn }
        { \ xeCJK_fallback_font_initial_auxiii:Nnnn }
        #1 {#2}
    }
\cs_new_protected:Npn \ xeCJK_fallback_font_initial_auxiii:Nnnn #1#2
    {
      \xeCJK_family_if_exist:nTF {#2}
        { \ xeCJK_fallback_font_initial_auxiv:Nnnn }
        { \ xeCJK_fallback_loop_end:Nnnn }
        #1 {#2}
    }
\cs_new_protected:Npn \ xeCJK_fallback_font_initial_auxiv:Nnnn #1#2#3#4
    {
      \ xeCJK_font_initial:Nn #1 {#2}
      \exp_args:Nc \ xeCJK_fallback_font_initial_auxiii:Nnnn
        { \ xeCJK_font_csname:n { #4/#3/FallBack } }
        { #2/FallBack } { #3/FallBack } { #4}
    }
\cs_new_eq:NN \ xeCJK_fallback_loop:TF \use_i:nn
\cs_new_protected:Npn \ xeCJK_fallback_loop_end:Nnnn #1#2#3#4
    { \cs_gset_eq:NN #1 \ xeCJK_fallback_loop_end: }
\cs_new_protected:Npn \ xeCJK_fallback_loop_end:
    { \cs_set_eq:NN \ xeCJK_fallback_loop:TF \use_ii:nn }
\ xeCJK_msg_new:nn { missing-glyph }
    {
      CJKfamily~`\ xeCJK_msg_family_map:n {#2}'~(#1)~
      does~not~contain~glyph~`#3'~
      ( U + \int_to_Hex:n { `#3 } )~\msg_line_context:.
    }
\NewDocumentCommand \setCJKfallbackfamilyfont { m o m }
    {
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family_fallback:nnn {#1} } {#2} {#3}
        { }
    }
\cs_new_protected:Npn \xeCJK_set_family_fallback:nnn #1#2#3
    {
      \group_begin:
      \tl_set:Nn \l xeCJK_fallback_family_tl {#1}
      \prop_get:NoNF \g xeCJK_family_font_name_prop
        \l xeCJK_fallback_family_tl \l xeCJK_font_name_tl
        { \tl_clear:N \l xeCJK_font_name_tl }
      \clist_set:Nn \l xeCJK_public_options_clist {#2}
      \clist_map_function:nN {#3} \ xeCJK_set_family_fallback:n
      \group_end:
    }
\cs_new_protected:Npn \ xeCJK_set_family_fallback:n #1
    {
      \tl_put_right:Nn \l xeCJK_fallback_family_tl { /FallBack }
      \ xeCJK_get_sub_features:on \l xeCJK_fallback_family_tl {#1}
      \clist_concat:NNN \l xeCJK_sub_font_options_clist
        \l xeCJK_public_options_clist
```

```
      \l xeCJK_sub_font_options_clist
    \exp_args:Nooo \xeCJK_set_family:nnn
      \l xeCJK_fallback_family_tl
      \l xeCJK_sub_font_options_clist
      \l xeCJK_sub_font_name_tl
  }
\tl_new:N \l xeCJK_fallback_family_tl
\clist_new:N \l xeCJK_public_options_clist
```

5.12 CJK font family declaration method

```
\bool_new:N \g xeCJK_auto_fake_bold_bool
\bool_new:N \g xeCJK_auto_fake_slant_bool
\fp_new:N \g xeCJK_embolden_factor_fp
\fp_new:N \g xeCJK_slant_factor_fp
```

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

AutoFakeSlant
EmboldenFactor
SlantFactor

```
\keys_define:nn { xeCJK / options }
{
  AutoFakeBold .choices:nn = { true , false }
    { \use:c { bool_gset_ \l_keys_choice_tl :N } \g xeCJK_auto_fake_bold_bool } ,
  AutoFakeBold / unknown .code:n =
    {
      \bool_gset_true:N \g xeCJK_auto_fake_bold_bool
      \fp_gset:Nn \g xeCJK_embolden_factor_fp { \l_keys_value_tl }
    } ,
  AutoFakeBold .default:n = { true } ,
  AutoFakeSlant .choices:nn = { true , false }
    { \use:c { bool_gset_ \l_keys_choice_tl :N } \g xeCJK_auto_fake_slant_bool } ,
  AutoFakeSlant / unknown .code:n =
    {
      \bool_gset_true:N \g xeCJK_auto_fake_slant_bool
      \fp_gset:Nn \g xeCJK_slant_factor_fp { \l_keys_value_tl }
    } ,
  AutoFakeSlant .default:n = { true } ,
  EmboldenFactor .fp_gset:N = \g xeCJK_embolden_factor_fp ,
  SlantFactor .fp_gset:N = \g xeCJK_slant_factor_fp ,
  BoldFont .meta:n = { AutoFakeBold = true } ,
  boldfont .meta:n = { AutoFakeBold = true } ,
  SlantFont .meta:n = { AutoFakeSlant = true } ,
  slantfont .meta:n = { AutoFakeSlant = true }
}
```

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

```
\seq_new:N \g xeCJK_sub_key_seq
\cs_new_protected:Npn \xeCJK_new_sub_key:n #1
  {
    \seq_gput_right:Nn \g xeCJK_sub_key_seq {#1}
    \keys_define:nn { xeCJK / features }
      {
        #1 .code:n =
          {
            \tl_if_blank:nTF {##1}
              {
                \prop_clear:N \l xeCJK_sub_key_prop
                \tl_set:Nx \l xeCJK_sub_family_name_tl
                  { \l xeCJK_family_name_tl /#1 }
                \clist_remove_all:Nn \l xeCJK_font_options_clist {#1}
              }
              {
                \tl_clear:N \l xeCJK_sub_family_name_tl
                \str_if_eq:nnTF {##1} { * }
                  { \prop_put:Nnn \l xeCJK_sub_key_prop {#1} { \q_no_value } }
                  { \ xeCJK_get_sub_features:nn {#1} {##1} }
              }
```

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

\ xeCJK_get_sub_ features:nn
\ xeCJK_get_sub_features:w
3194 \cs_new_protected:Npn \ xeCJK_get_sub_features:nn #1#2
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
ItalicFont
```

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

```
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
AutoFakeSlant
3232 \keys_define:nn { xeCJK / features }
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   {
```

```
      \cs_gset_protected:cpx { \ xeCJK_family_csname:n {#1} }
        {
          \group_begin:
          \exp_not:n { \cs_set_eq:NN \xeCJK@fontfamily \use_none:n }
          \exp_not:n { \fontspec_gset_family:Nnn \g xeCJK_fontspec_family_tl }
            { \exp_not:o \l xeCJK_fontspec_options_clist }
            { \exp_not:o \l xeCJK_font_name_tl }
          \ xeCJK_gset_family_nfss_cs:no
            {#1} { \exp_not:N \g xeCJK_fontspec_family_tl }
          \group_end:
          \tl_set_eq:NN \exp_not:N \l xeCJK_fontspec_family_tl
                        \exp_not:N \g xeCJK_fontspec_family_tl
        }
    }
\tl_new:N \g xeCJK_fontspec_family_tl
\tl_new:N \l xeCJK_fontspec_family_tl

\ xeCJK_check_ family:n \cs_new_protected:Npn \ xeCJK_check_family:n #1
    {
      \prop_gpop:NnNT \g xeCJK_family_font_name_prop {#1} \l xeCJK_tmp_tl
        {
          \prop_gpop:NnNT \g xeCJK_family_name_prop {#1} \l xeCJK_tmp_tl
            {
              \cs_undefine:c { \ xeCJK_family_csname:n {#1} }
              \cs_undefine:c { \ xeCJK_family_nfss_csname:n {#1} }
            }
          \ xeCJK_warning:nxx { CJKfamily-redef } {#1} { \l xeCJK_tmp_tl }
        }
    }
\cs_generate_variant:Nn \ xeCJK_check_family:n { o }
\ xeCJK_msg_new:nn { CJKfamily-redef }
    { Redefining~CJKfamily~`\ xeCJK_msg_family_map:n {#1}'~(#2). }

\ xeCJK_parse_font_ shape: \cs_new_protected:Npn \ xeCJK_parse_font_shape:
    {
      \tl_if_blank:oTF \l xeCJK_font_name_bf_tl
        {
          \bool_if:NT \l xeCJK_auto_fake_bold_bool
            {
              \clist_put_right:Nx \l xeCJK_fontspec_options_clist
                { AutoFakeBold = { \fp_use:N \l xeCJK_embolden_factor_fp } }
            }
        }
        {
          \clist_put_right:Nx \l xeCJK_fontspec_options_clist
            { BoldFont = { \exp_not:o \l xeCJK_font_name_bf_tl } }
        }
      \tl_if_blank:oTF \l xeCJK_font_name_it_tl
        {
          \bool_if:NT \l xeCJK_auto_fake_slant_bool
            {
              \clist_put_right:Nx \l xeCJK_fontspec_options_clist
                { AutoFakeSlant = { \fp_use:N \l xeCJK_slant_factor_fp } }
            }
        }
        {
          \clist_put_right:Nx \l xeCJK_fontspec_options_clist
            { ItalicFont = { \exp_not:o \l xeCJK_font_name_it_tl } }
        }
    }

\g xeCJK_family_name_ prop \prop_new:N \g xeCJK_family_name_prop
\g xeCJK_family_font_name_prop \prop_new:N \g xeCJK_family_font_name_prop
\g xeCJK_family_font_options_prop \prop_new:N \g xeCJK_family_font_options_prop

\ xeCJK_save_family_ info: \cs_new_protected:Npn \ xeCJK_save_family_info:
    {
      \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_fontspec_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_fontspec_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: \l_xeCJK_current_font_tl

Cache the original format of current font to speed up the compilation.

```
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 errors (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
\tl_new:N \g xeCJK_font_initial_hook_tl
```

\xeCJK_select_punct_font: \l_xeCJK_current_punct_font_tl

Switch the punctuation font.

```
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 } }
```

```
\cs_new_eq:NN \ xeCJK_select_font: \prg_do_nothing:
\cs_new_eq:NN \ xeCJK_select_punct_font: \prg_do_nothing:
```

\ xeCJK_switch_ font:nn Switch the font between two CJK partitions.

```
\cs_new_protected:Npn \ xeCJK_switch_font:nn #1#2
  {
    \str_if_eq:nnF {#1} {#2}
      {
        \ xeCJK_info:nxx { CJK-block } {#1} {#2}
        \str_if_eq:nnTF {#2} { CJK }
          { \xeCJK_select_font: }
          { \xeCJK_select_font:n {#2} }
      }
  }
\ 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.

```
\cs_new_protected:Npn \xeCJK_select_font:n #1
  {
    \ xeCJK_select_font:cnn
      { \ xeCJK_font_csname:n { \CJK@family/#1 } }
      { \l_xeCJK_family_tl }
      {#1}
  }
\cs_new_protected:Npn \ xeCJK_select_font:Nnn #1#2#3
  {
    \xeCJK_clear_fallback_font:
    \cs_if_exist:NF #1
      { \ xeCJK_block_font_initial:Nnn #1 {#2} {#3} }
    #1
  }
\cs_generate_variant:Nn \ xeCJK_select_font:Nnn { c }
\cs_new_protected:Npn \ xeCJK_block_font_initial:Nnn #1#2#3
  {
    \xeCJK_block_family:nn {#2} {#3}
    \ xeCJK_font_initial:Nn #1 { #2/#3 }
  }
\cs_new_protected:Npn \xeCJK_block_family:nn #1#2
  {
    \xeCJK_family_if_exist:eF { #1/#2 }
      {
        \ xeCJK_copy_family:ee { #1/#2 }
          {
            \cs_if_exist:cTF
              { \ xeCJK_family_csname:n { \CJKfamilydefault/#2 } }
              { \CJKfamilydefault/#2 } {#1}
          }
      }
  }
```

\ xeCJK_family_ csname:n
\ xeCJK_family_nfss_csname:n
\ xeCJK_family_use:n
\ xeCJK_gset_family_nfss_cs:nn

```
\ cs_new:Npn \ xeCJK_family_csname:n #1
  { xeCJK/family/#1 }
\cs_new:Npn \ xeCJK_family_nfss_csname:n #1
  { xeCJK/family/nfss/#1 }
\cs_new_protected:Npn \ xeCJK_family_use:n #1
  { \use:c { \ xeCJK_family_nfss_csname:n {#1} } }
\cs_new_protected:Npn \ xeCJK_gset_family_nfss_cs:nn #1#2
  {
    \prop_gput:Nnn \g xeCJK_family_name_prop {#1} {#2}
    \cs_gset_protected:cpx
      { \ xeCJK_family_nfss_csname:n {#1} }
      { \ xeCJK_nfss_family:nn { \c xeCJK_encoding_tl } {#2} }
  }
\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.

```
\cs_if_exist:NTF \fontseriesforce
  {
    \cs_new_protected:Npn \ xeCJK_nfss_family:nn #1#2
      {
        \fontencoding {#1}
        \str_if_eq:eeF { \f@series } { \bfdefault }
          {
            \str_case_e:nn { \f@family }
              {
                { \rmdefault } { \ xeCJK_nfss_series:n { rm } }
                { \sfdefault } { \ xeCJK_nfss_series:n { sf } }
                { \ttdefault } { \ xeCJK_nfss_series:n { tt }
              }
          }
        \fontfamily {#2}
        \selectfont
      }
    \cs_new_protected:Npn \ xeCJK_nfss_series:n #1
      {
        \str_if_eq:eeT { \f@series } { \use:c { bfseries@#1 } }
          { \fontseriesforce { \bfdefault } }
      }
  }
  {
    \cs_new_protected:Npn \ xeCJK_nfss_family:nn #1#2
      {
        \fontencoding {#1}
        \tl_set:Nn \f@family {#2}
        \selectfont
      }
  }
```

\xeCJK_family_if_exist:n *TF*

```
\prg_new_protected_conditional:Npnn \xeCJK_family_if_exist:n #1 { T , F , TF }
  {
    \prop_get:NnNTF \g xeCJK_family_name_prop
      {#1} \l xeCJK_fontspec_family_tl
      { \prg_return_true: }
      {
        \exp_args:Ne \cs_if_exist_use:cTF
          { \ xeCJK_family_csname:n {#1} }
          { \prg_return_true: }
          { \prg_return_false: }
      }
  }
\prg_generate_conditional_variant:Nnn \xeCJK_family_if_exist:n { e } { T , F , TF }
```

\CJKfamily is used to switch the CJK font family.

```
\NewDocumentCommand \CJKfamily { t+ t- m }
  {
    \xeCJK_family:NNe #1 #2 {#3}
    \tex_ignorespaces:D
  }
\cs_new_protected:Npn \xeCJK_family:NNNn #1#2#3
  {
    \tl_if_blank:nTF {#3}
      {
        \bool_if:NF #1 { \bool_if:NF #2 { \use_none:nn } }
        \xeCJK_family_if_exist_use:e { \l_xeCJK_family_tl }
      }
      {
        \bool_if:NTF #2
          { \xeCJK_family_if_exist_use:n {#3} }
          {
            \xeCJK_family_if_exist:nTF {#3}
              {
```

```
                \tl_set:Nn \l_xeCJK_family_tl {#3}
                \tl_set_eq:NN \CJK@family \l xeCJK_fontspec_family_tl
                \ bool_if:NT #1 { \ xeCJK_family_use:n {#3} }
              }
              { \ xeCJK_family_unknown_warning:n {#3} }
          }
      }
  }
\cs_generate_variant:Nn \xeCJK_family:NNn { NNe }
\cs_new_protected:Npn \xeCJK_switch_family:n #1
  {
    \xeCJK_family_if_exist:nTF {#1}
      {
        \tl_set:Nn \l_xeCJK_family_tl {#1}
        \tl_set_eq:NN \CJK@family \l xeCJK_fontspec_family_tl
      }
      { \ xeCJK_family_unknown_warning:n {#1} }
  }
\cs_generate_variant:Nn \xeCJK_switch_family:n { e , o }
```

PunctFamily sets the font for Chinese punctuation.

```
\keys_define:nn { xeCJK / options }
  {
    PunctFamily .choice: ,
    PunctFamily .value_required:n = { true } ,
    PunctFamily / false       .code:n =
      {
        \tl_set:Nn \CJK@punctfamily { \CJK@family }
        \tl_set:Nn \l_xeCJK_punct_family_tl { \l_xeCJK_family_tl }
        \xeCJK_cs_clear:N \ xeCJK_select_font:
        \xeCJK_cs_clear:N \ xeCJK_select_punct_font:
        \cs_set_eq:NN \xeCJK_select_punct_font: \xeCJK_select_font:
      } ,
    PunctFamily / unknown .code:n =
      { \xeCJK_punct_family:e {#1} } ,
  }
\cs_new_protected:Npn \xeCJK_punct_family:n #1
  {
    \xeCJK_family_if_exist:nTF {#1}
      {
        \tl_set:Nn \l_xeCJK_punct_family_tl {#1}
        \tl_set_eq:NN \CJK@punctfamily \l xeCJK_fontspec_family_tl
        \cs_set_eq:NN \ xeCJK_select_font: \xeCJK_select_font:
        \cs_set_eq:NN  \   xeCJK_select_punct_font: \ xeCJK_select_punct_font_aux:
        \cs_set_eq:NN \xeCJK_select_punct_font: \ xeCJK_select_punct_font:
      }
      { \ xeCJK_family_unknown_warning:n {#1} }
  }
\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.

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

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

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

\ xeCJK_gobble_ CJKfamily:

```
\cs_new_protected:Npn \ xeCJK_gobble_CJKfamily:
  { \cs_set_eq:NN \CJKfamily \ xeCJK_gobble_CJKfamily:wn }
\NewExpandableDocumentCommand \ xeCJK_gobble_CJKfamily:wn { t+ t- m } { }
```

\xeCJK_family_if_exist_use:n

```
\cs_new_protected:Npn \xeCJK_family_if_exist_use:n #1
  {
    \xeCJK_family_if_exist:nTF {#1}
      { \ xeCJK_family_use:n {#1} }
      { \ xeCJK_family_unknown_warning:n {#1} }
  }
\cs_generate_variant:Nn \xeCJK_family_if_exist_use:n { e }
```

_xeCJK_family_unknown_warning:n
```
\cs_new_protected:Npn \ xeCJK_family_unknown_warning:n #1
  {
    \prop_if_empty:NF \g xeCJK_family_font_name_prop
      {
        \seq_if_in:NnF \g xeCJK_unknown_family_seq {#1}
          {
            \seq_gput_right:Nn \g xeCJK_unknown_family_seq {#1}
            \ xeCJK_warning:nx { CJKfamily-Unknown } {#1}
          }
      }
  }
\seq_new:N \g xeCJK_unknown_family_seq
\ xeCJK_msg_new:nn { CJKfamily-Unknown }
  {
    Unknown~CJK~family~`\ xeCJK_msg_family_map:n {#1}'~is~being~ignored.\\\\
    Try~to~use~`\ xeCJK_msg_def_family_map:n {#1}'~to~define~it.
  }
\cs_new:Npn \ xeCJK_msg_def_family_map:n #1
  {
    \str_case_e:nnF {#1}
      {
        \CJKrmdefault { \token_to_str:N \setCJKmainfont }
        \CJKsfdefault { \token_to_str:N \setCJKsansfont }
        \CJKttdefault { \token_to_str:N \setCJKmonofont
} }
      { \token_to_str:N \setCJKfamilyfont \{ #1 \} }
    [<... >]\{<... >\}
  }
\cs_new:Npn \ xeCJK_msg_family_map:n #1
  {
    \str_case_e:nnF {#1}
      {
        \CJKrmdefault { \token_to_str:N \CJKrmdefault }
        \CJKsfdefault { \token_to_str:N \CJKsfdefault }
        \CJKttdefault { \token_to_str:N \CJKttdefault }
      }
      {#1}
}
```

\ 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.

```
\cs_new_protected:Npn \ xeCJK_pass_args:nnnn #1#2#3#4
  {
    \tl_if_novalue:nTF {#2}
      { \ xeCJK_post_arg:w {#1} {#3} {#4} }
      {
        \use:e { #1 {#2} {#3} }
        #4
      }
  }
\ NewDocumentCommand \ xeCJK_post_arg:w { m m m 0 { } }
  {
    \use:e { #1 {#4} {#2} }
    #3
  }
```

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

```
\NewDocumentCommand \setCJKmainfont { o m }
  {
    \ xeCJK_pass_args:nnn
      { \xeCJK_set_family:nnn { \CJKrmdefault } } {#1} {#2}
      { \ xeCJK_preamble_family:n { \CJKrmdefault } }
  }
\cs_new_eq:NN \setCJKromanfont \setCJKmainfont
\NewDocumentCommand \setCJKsansfont { o m }
  {
```

```
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family:nnn { \CJKsfdefault } } {#1} {#2}
        { \ xeCJK_preamble_family:n { \CJKsfdefault } }
    }
\NewDocumentCommand \setCJKmonofont { o m }
    {
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family:nnn { \CJKttdefault } } {#1} {#2}
        { \ xeCJK_preamble_family:n { \CJKttdefault } }
    }

\@onlypreamble \setCJKmainfont
\@onlypreamble \setCJKmathfont
\@onlypreamble \setCJKsansfont
\@onlypreamble \setCJKmonofont
\@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.

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

\setCJKfamilyfont is used to pre-declare CJK font family and declare and call CJK font family immediately, \newCJKfontfamily.

\CJKfontspec

```
\NewDocumentCommand \setCJKfamilyfont { m o m }
    {
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family:nnn {#1} } {#2} {#3}
        { }
    }
\NewDocumentCommand \newCJKfontfamily { o m o m }
    {
      \tl_set:Nx \l xeCJK_tmp_tl
        { \tl_if_novalue:nTF {#1} { \cs_to_str:N #2 } {#1} }
      \cs_new_protected:Npx #2
        { \xeCJK_switch_family:n { \l xeCJK_tmp_tl } }
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family:nnn { \l xeCJK_tmp_tl } } {#3} {#4}
        { }
    }
\NewDocumentCommand \CJKfontspec { o m }
    {
      \ xeCJK_pass_args:nnn
        { \xeCJK_fontspec:nn } {#1} {#2}
        { \tex_ignorespaces:D }
    }
```

\xeCJK_fontspec:nn

```
\cs_new_protected:Npn \xeCJK_fontspec:nn #1#2
    {
      \prop_get:NnNTF \g xeCJK_fontspec_prop
        { CJKfontspec/#1/#2/id } \l_xeCJK_family_tl
        { \xeCJK_switch_family:o { \l_xeCJK_family_tl } }
        {
          \ xeCJK_fontspec:enn
            { CJKfontspec ( \int_eval:n { \g xeCJK_family_int + 1 } ) }
            {#1} {#2}
        }
    }
\cs_new_protected:Npn \ xeCJK_fontspec:nnn #1#2#3
    {
      \prop_gput:Nnn \g xeCJK_fontspec_prop { CJKfontspec/#2/#3/id } {#1}
      \xeCJK_set_family:nnn {#1} {#2} {#3}
      \xeCJK_switch_family:n {#1}
    }
\cs_generate_variant:Nn \xeCJK_fontspec:nn { oo }
\cs_generate_variant:Nn \xeCJK_fontspec:nnn { e }
\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.

\addCJKfontfeatures

```
\clist_new:N \g xeCJK_default_features_clist
\NewDocumentCommand \defaultCJKfontfeatures { m }
  { \clist_gset:Nn \g xeCJK_default_features_clist {#1} }
\@onlypreamble \defaultCJKfontfeatures
\NewDocumentCommand \addCJKfontfeatures { s O { } m }
  {
    \xeCJK_add_font_features:Nee #1 {#2} {#3}
    \tex_ignorespaces:D
  }
\cs_new_eq:NN \addCJKfontfeature \addCJKfontfeatures
```

\xeCJK_add_font_features:Nnn

```
\cs_new_protected:Npn \xeCJK_add_font_features:Nnn #1#2#3
  {
    \prop_get:NoNTF \g xeCJK_family_font_name_prop
      \l_xeCJK_family_tl \l xeCJK_font_name_tl
      {
        \clist_set:Nn \l xeCJK_add_font_features_clist {#3}
        \seq_map_inline:Nn \g xeCJK_sub_key_seq
          { \clist_remove_all:Nn \l xeCJK_add_font_features_clist {##1} }
        \seq_clear:N \l xeCJK_sub_key_seq
        \clist_clear:N \l xeCJK_add_block_features_clist
        \clist_map_function:nN {#2} \ xeCJK_add_sub_features:n
        \bool_lazy_and:nnT
          {#1}
          { \seq_if_empty_p:N \l xeCJK_sub_key_seq }
          {
            \seq_map_function:NN
              \g xeCJK_sub_key_seq \ xeCJK_add_sub_class_features:n
          }
        \prop_get:NoNT \g xeCJK_family_font_options_prop
          \l_xeCJK_family_tl \l xeCJK_font_options_clist
          {
            \bool_lazy_or:nnT
              { \seq_if_empty_p:N \l xeCJK_sub_key_seq }
              {#1}
              {
                \clist_concat:NNN \l xeCJK_font_options_clist
                  \l xeCJK_font_options_clist \l xeCJK_add_font_features_clist
              }
            \clist_concat:NNN \l xeCJK_font_options_clist
              \l xeCJK_font_options_clist \l xeCJK_add_block_features_clist
          }
        \xeCJK_fontspec:oo \l xeCJK_font_options_clist \l xeCJK_font_name_tl
      }
      { \ xeCJK_warning:n { addCJKfontfeature-ignored } }
  }
```

_xeCJK_add_sub_class_ features:n

```
\cs_new_protected:Npn \ xeCJK_add_sub_features:n #1
  {
    \seq_if_in:NnTF \g xeCJK_sub_key_seq {#1}
      {
        \seq_put_right:Nn \l xeCJK_sub_key_seq {#1}
        \ xeCJK_add_sub_class_features:n {#1}
      }
      { \ xeCJK_warning:nx { SubBlock-undefined } {#1} }
  }
\clist_new:N \l xeCJK_add_font_features_clist
\clist_new:N \l xeCJK_add_block_features_clist
\cs_generate_variant:Nn \xeCJK_add_font_features:Nnn { Nee , Nne }
\ xeCJK_msg_new:nn { addCJKfontfeature-ignored }
  {
    \token_to_str:N \addCJKfontfeature (s)~ignored.\\\\
    It~cannot~be~used~with~a~font~that~wasn't~selected~by~xeCJK.
  }
\cs_new_protected:Npn \ xeCJK_add_sub_class_features:n #1
  {
```

```
    \prop_get:NoNTF \g xeCJK_family_font_name_prop
      { \l_xeCJK_family_tl/#1 } \l xeCJK_sub_font_name_tl
      {
        \prop_get:NoN \g xeCJK_family_font_options_prop
          { \l_xeCJK_family_tl/#1 } \l xeCJK_sub_font_options_clist
      }
      {
        \prop_get:NeNTF \g xeCJK_family_font_name_prop
          { \CJKfamilydefault/#1 } \l xeCJK_sub_font_name_tl
          {
            \prop_get:NeN \g xeCJK_family_font_options_prop
              { \CJKfamilydefault/#1 } \l xeCJK_sub_font_options_clist
          }
          {
            \prop_get:NoN \g xeCJK_family_font_options_prop
              \l_xeCJK_family_tl \l xeCJK_sub_font_options_clist
            \tl_set_eq:NN \l xeCJK_sub_font_name_tl \l xeCJK_font_name_tl
          }
      }
    \clist_concat:NNN \l xeCJK_sub_font_options_clist
      \l xeCJK_sub_font_options_clist \l xeCJK_add_font_features_clist
    \clist_put_right:Nx \l xeCJK_add_block_features_clist
      {
        #1 =
          {
            [ \exp_not:o \l xeCJK_sub_font_options_clist ]
            { \exp_not:o \l xeCJK_sub_font_name_tl }
          }
      }
  }
\cs_generate_variant:Nn \prop_get:NnN { Ne }
\prg_generate_conditional_variant:Nnn \prop_get:NnN { Ne } { T , TF }
\keys_define:nn { xeCJK / options }
  { LoadFandol .bool_gset:N = \g xeCJK_fandol_bool }
\cs_new_protected:Npn \ xeCJK_load_fandol:
  {
    \xeCJK_set_family:enn { \CJKrmdefault }
      { Extension = .otf , BoldFont = FandolSong-Bold , ItalicFont = FandolKai-Regular }
      { FandolSong-Regular }
    \xeCJK_set_family:enn { \CJKsfdefault }
      { Extension = .otf , BoldFont = FandolHei-Bold } { FandolHei-Regular }
    \xeCJK_set_family:enn { \CJKttdefault }
      { Extension = .otf } { FandolFang-Regular }
  }
```

LoadFandol

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.

```
\ xeCJK_at_end_preamble:n
  {
    \tl_if_eq:NNT \CJKfamilydefault \l xeCJK_family_default_init_tl
      {
        \group_begin:
        \cs_set_eq:NN \ xeCJK_family_default_wrap:n \exp_not:n
        \tl_gset:Nx \CJKfamilydefault
          {
            \str_case:onF { \familydefault }
              {
                  { \rmdefault } { \exp_not:N \CJKrmdefault }
                { \sfdefault } { \exp_not:N \CJKsfdefault }
              { \ttdefault } { \exp_not:N \CJKttdefault }
              }
              { \CJKfamilydefault }
```

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```
      \group_end:
    }
  \prop_if_empty:NTF \g xeCJK_family_font_name_prop
    {
      \bool_if:NTF \g xeCJK_fandol_bool
        {
          \ xeCJK_warning:n { fandol }
          \ xeCJK_load_fandol:
          \xeCJK_ensure_default_family:
        }
        { \ xeCJK_warning:nx { no-CJKfamily } { \CJKfamilydefault } }
    }
    { \xeCJK_ensure_default_family: }
}
\cs_new_protected:Npn \xeCJK_ensure_default_family:
{
  \xeCJK_family_if_exist:eF { \CJKfamilydefault }
    {
      \tl_set_eq:NN \l xeCJK_tmp_tl \CJKfamilydefault
      \str_if_eq:eeTF { \CJKfamilydefault } { \CJKrmdefault }
        { \use:n }
        {
          \xeCJK_family_if_exist:eTF { \CJKrmdefault }
            { \tl_gset:Nn \CJKfamilydefault { \CJKrmdefault } }
        }
        {
          \prop_map_inline:Nn \g xeCJK_family_font_name_prop
            {
              \prop_map_break:n
                { \tl_gset_rescan:Nnn \CJKfamilydefault { } { ##1 }
            }
        }
      \ xeCJK_warning:nxx { CJKfamilydefault-undefined }
        { \l xeCJK_tmp_tl } { \CJKfamilydefault }
    }
  \xeCJK_switch_family:e { \CJKfamilydefault }
  \bool_if:NT \g xeCJK_math_bool { \xeCJK_set_mathfont: }
}
\ xeCJK_msg_new:nn { no-CJKfamily }
{
  It~seems~that~you~have~not~declare~a~CJKfamily.\\
  If~you~want~to~use~xeCJK~in~the~right~way,~you~should~use\\\\
  `\ xeCJK_msg_def_family_map:n {#1}'\\\\
  in~the~preamble~to~declare~the~default~CJKfamily.\\
}
\ xeCJK_msg_new:nn { CJKfamilydefault-undefined }
{
  Undefined~CJK~default~family~`\ xeCJK_msg_family_map:n {#1}'~
  has~been~replaced~by~`\ xeCJK_msg_family_map:n {#2}'. \\\\
  Try~to~use~`\ xeCJK_msg_def_family_map:n {#1}'~to~define~it.
}
\ xeCJK_msg_new:nn { fandol }
{
  Fandol~is~being~set~as~the~default~font~for~CJK~text.\\
  Please~make~sure~it~has~been~properly~installed.
}
```

5.14 Math font settings

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

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

\setCJKmathfont Set the CJK math font.

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

```
      \ xeCJK_pass_args:nnn
        { \xeCJK_set_family:nnn { \c xeCJK_math_tl } } {#1} {#2}
        { }
    }
\tl_const:Nn \c xeCJK_math_tl { CJKmath }
```

\xeCJK_set_mathfont: Use \CJKfamilydefault as the math font when no CJK **math** font is set.

```
\cs_new_protected:Npn \xeCJK_set_mathfont:
  {
    \cs_if_exist_use:N \ xeCJK_save_um_char:
    \xeCJK_family_if_exist:eTF { \c xeCJK_math_tl }
      { \ xeCJK_set_mathfont_aux: }
      {
        \xeCJK_family_if_exist:eT { \CJKfamilydefault }
          {
            \ xeCJK_copy_family:ee { \c xeCJK_math_tl } { \CJKfamilydefault }
            \ xeCJK_set_mathfont_aux:
          }
      }
    \cs_if_exist_use:N \ xeCJK_restore_um_char:
  }
\cs_new_protected:Npn \ xeCJK_set_mathfont_aux:
  {
    \tl_const:Nx \c xeCJK_math_family_tl
      { \l xeCJK_fontspec_family_tl }
    \xeCJK_declare_mathfont:ee
      { \c xeCJK_math_tl }
      { \c xeCJK_math_family_tl }
    \int_const:Nn \c_xeCJK_math_fam_int
      { \use:c { sym \c xeCJK_math_tl } }
    \clist_gconcat:NNN \g xeCJK_math_chars_clist
      \g xeCJK_CJK_range_clist \g xeCJK_FullLeft_range_clist
    \clist_gconcat:NNN \g xeCJK_math_chars_clist
      \g xeCJK_math_chars_clist \g xeCJK_FullRight_range_clist
    \xeCJK_gset_mathcode:Nn \g xeCJK_math_chars_clist
      { \c_xeCJK_math_fam_int }
    \xeCJK_set_mathfont_block:
  }
\clist_new:N \g xeCJK_math_chars_clist
\prop_new:N \g xeCJK_fam_prop
```

\xeCJK_set_mathfont_block: The math font of the partition.

```
\cs_new_protected:Npn \xeCJK_set_mathfont_block:
  {
    \seq_if_empty:NF \g xeCJK_CJK_sub_class_seq
      {
        \seq_map_function:NN
          \g xeCJK_CJK_sub_class_seq
          \xeCJK_set_mathfont_block:n
      }
  }
\cs_new_protected:Npn \xeCJK_set_mathfont_block:n #1
  {
    \xeCJK_block_family:nn { \c xeCJK_math_tl } {#1}
    \prop_get:NoNTF \g xeCJK_fam_prop
      \l xeCJK_fontspec_family_tl \l xeCJK_tmp_tl
      { \int_set:Nn \l xeCJK_fam_int { \l xeCJK_tmp_tl }
      {
        \xeCJK_declare_mathfont:ee
          { \c xeCJK_math_tl / #1 }
          { \l xeCJK_fontspec_family_tl }
        \ xeCJK_set_mathfont_block_aux:cn
          { sym \c xeCJK_math_tl / #1 } {#1}
      }
    \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 2ε 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:nnnnnn {#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:nnnnnn #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 2ε 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.
\ xeCJK_new_symbol_font:NN

```
\cs_new_protected:Npn \xeCJK_new_symbol_font:Nnnnn #1#2#3#4#5
  { \ xeCJK_new_symbol_font:Nc #1 { #2/#3/#4/#5 } }
\cs_new_protected:Npn \ xeCJK_new_symbol_font:NN #1#2
  {
    \tl_put_right:Nn \group@list { \group@elt #1 #2 }
    \cs_set:Npn \version@elt ##1
      { \tl_put_right:Nn ##1 { \getanddefine@fonts #1 #2 } }
    \version@list
  }
\cs_generate_variant:Nn \ xeCJK_new_symbol_font:NN { Nc }
```

\xeCJK_gset_mathcode:Nn The math category of CJK character is fixed to 0(\mathord)
\xeCJK_gset_mathcode:Nnn
\xeCJK_gset_mathcode:nnnn

```
\cs_new_protected:Npn \xeCJK_gset_mathcode:Nn #1#2
  {
    \clist_map_inline:Nn #1
      {
        \ xeCJK_set_char_class_aux:Nnw \  xeCJK_gset_mathcode:nnnn { ##1 }
          { 0 } {#2}
      }
  }
\cs_generate_variant:Nn \xeCJK_gset_mathcode:Nn { c }
\cs_new_protected:Npn \xeCJK_gset_mathcode:nnnn #1#2#3#4
  {
    \ xeCJK_check_num_range:nnNN {#1} {#2} \l xeCJK_begin_int \l xeCJK_end_int
    \xeCJK_int_until_do:nn { \l xeCJK_begin_int > \l xeCJK_end_int }
      {
        \xeCJK_gset_mathcode:Nnn \l xeCJK_begin_int {#3} {#4}
        \int_incr:N \l xeCJK_begin_int
      }
  }
\cs_new_protected:Npn \xeCJK_gset_mathcode:Nnn #1#2#3
  { \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.

```
\int_new:N \l xeCJK_verb_case_int
\keys_define:nn { xeCJK / options }
  {
    Verb .choices:nn =
      { true , env+ , env , false }
      { \int_set_eq:NN \l xeCJK_verb_case_int \l_keys_choice_int } ,
    Verb .default:n = { env }
  }
\cs_new_protected:Npn \ xeCJK_verb_font_hook:
  {
    \if_case:w \l xeCJK_verb_case_int
    \or:
      \ xeCJK_nobreak_skip_zero:
    \or:
      \int_compare:nNnTF \tex_currentgrouptype:D = { 14 }
        { \xeCJKVerbAddon }
        { \ xeCJK_nobreak_skip: }
    \or:
      \int_compare:nNnTF \tex_currentgrouptype:D = { 14 }
        { \xeCJKVerbAddon }
        { \ xeCJK_nobreak_skip_zero: }
    \fi:
  }
\ xeCJK_after_preamble:n
  {
    \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 \l xeCJK_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        \xeCJK_cs_clear:N \CJKglue
4163        \xeCJK_cs_clear:N \CJKecglue
4164        \xeCJK_cs_clear:N \xeCJK_check_for_glue:
4165        \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_class_group_end:
4166        \cs_set_eq:NN \ xeCJK_punct_hskip:n \ xeCJK_nobreak_hskip:n
4167        \cs_set_eq:NN \ xeCJK_punct_breakable_kern:n \ xeCJK_nobreak_hskip:n
4168    }
4169 \cs_new_protected:Npn \ xeCJK_nobreak_skip:
4170    {
4171        \ xeCJK_reset_shipout_skip:
4172        \xeCJK_glue_to_skip:nN { \CJKglue } \l xeCJK_ccglue_skip
4173        \skip_if_eq:nnTF { \l xeCJK_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 { \CJKecglue } \l xeCJK_ecglue_skip
4177        \skip_if_eq:nnTF { \l xeCJK_ecglue_skip } { \c_zero_skip } 4178
            { \xeCJK_cs_clear:N \CJKecglue }
4179          { \cs_set_eq:NN \CJKecglue \ 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 \l xeCJK_ccglue_skip }
4185 \cs_new_protected:Npn \ xeCJK_nobreak_ecglue:
4186    { \xeCJK_no_break: \skip_horizontal:N \l xeCJK_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_CJKecglue: \CJKecglue
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 \l xeCJK_off_verb_addon_tl
4195          {
4196            \bool_if:NTF \l xeCJK_xecglue_bool
4197              { \keys_set:nn { xeCJK / options } { xCJKecglue = true } } 4198
              { \keys_set:nn { xeCJK / options } { xCJKecglue = false } } 4199
            \exp_not:n
4200            {
4201              \cs_set_eq:NN \CJKglue \ xeCJK_shipout_CJKglue:
4202              \cs_set_eq:NN \CJKecglue \ xeCJK_shipout_CJKecglue:
4203              \cs_set_eq:NN \ xeCJK_punct_hskip:n \ xeCJK_shipout_punct_hskip:n
4204              \cs_set_eq:NN \ xeCJK_punct_breakable_kern:n
4205                            \ xeCJK_shipout_punct_breakable_kern:n
4206              \l xeCJK_reset_shipout_skip_hook_tl
4207            }
4208          }
4209        \xeCJK_add_to_shipout:n { \l xeCJK_off_verb_addon_tl }
4210        \keys_set:nn { xeCJK / options } { xCJKecglue = false }
4211 }
4212 \tl_new:N \l xeCJK_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 \CJKecglue 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.

```
\NewDocumentCommand \xeCJKVerbAddon { }
  {
    \int_compare:nNnF \tex_currentgrouplevel:D = \c_zero_int
      {
        \bool_if:NF \l xeCJK_listings_env_bool
          {
            \dim_compare:nNnTF
              { \tex_fontdimen:D 2 ~ \tex_font:D } =
              { \tex_fontcharwd:D \tex_font:D \c xeCJK_mono_letter_int }
              {
                \ xeCJK_set_verb_exspace:
                \ xeCJK_verb_addon:
              }
              {
                \int_if_odd:nTF { \l xeCJK_verb_case_int }
                  { \ xeCJK_nobreak_skip_zero: }
                  { \ xeCJK_nobreak_skip: }
              }
          }
      }
  }
\int_const:Nn \c xeCJK_mono_letter_int { 77 }
\bool_new:N \l xeCJK_listings_env_bool
\NewDocumentCommand \xeCJKOffVerbAddon { }
   { \tl_use:N  \ l  xeCJK_off_verb_addon_tl }
\tl_new:N \l xeCJK_off_verb_addon_tl
\cs_new_protected:Npn \ xeCJK_verb_addon:
  {
    \bool_if:NF \l xeCJK_verb_addon_bool
      { \ xeCJK_verb_addon_action: }
    \skip_if_eq:nnTF { \l xeCJK_verb_exspace_skip } { \c_zero_skip }
      {
        \xeCJK_cs_clear:N \CJKglue
        \xeCJK_cs_clear:N \CJKecglue
      }
      {
        \skip_set_eq:NN \l xeCJK_ccglue_skip \l xeCJK_verb_exspace_skip
        \skip_set:Nn \l xeCJK_ecglue_skip { \l xeCJK_verb_exspace_skip / 2 }
        \cs_set_eq:NN  \CJKglue  \  xeCJK_nobreak_ccglue:
        \cs_set_eq:NN  \CJKecglue  \  xeCJK_nobreak_ecglue:
      }
    \cs_set_eq:NN \xeCJK_check_for_glue: \CJKecglue
    \cs_set_eq:NN \xeCJK_CJK_and_Boundary:w \xeCJK_verb_CJK_and_Boundary:w
  }
\cs_new_protected:Npn \ xeCJK_verb_addon_action:
  {
    \bool_set_true:N \l xeCJK_verb_addon_bool
    \ xeCJK_set_char_class_eq:nn { FullLeft }      { CJK }
      \ xeCJK_set_char_class_eq:nn { FullRight }   { CJK }
    \ xeCJK_set_char_class_eq:nn { HalfLeft }      { Default }
      \ xeCJK_set_char_class_eq:nn { HalfRight }   { Default }
     \ xeCJK_set_char_class_eq:nn { NormalSpace } { Default }
    \cs_set_eq:NN \ xeCJK_shipout_CJKglue:       \CJKglue
    \cs_set_eq:NN  \  xeCJK_shipout_CJKecglue: \CJKecglue
    \cs_set_eq:NN  \  xeCJK_shipout_check_for_glue: \xeCJK_check_for_glue:
    \cs_set_eq:NN \ xeCJK_shipout_boundary:w \xeCJK_CJK_and_Boundary:w
    \cs_set_protected:Npx \xeCJKOffVerbAddon
      {
        \ xeCJK_reset_char_class:n { FullLeft }
        \ xeCJK_reset_char_class:n { FullRight }
        \ xeCJK_reset_char_class:n { HalfLeft }
        \ xeCJK_reset_char_class:n { HalfLeft }
        \ xeCJK_reset_char_class:n { NormalSpace }
        \bool_if:NTF \l xeCJK_xecglue_bool
```

```
4277              { \keys_set:nn { xeCJK / options } { xCJKecglue = true }
4278              { \keys_set:nn { xeCJK / 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  \ x e C J K _ c h e c k _ f o r _ g l u e : \
                    xeCJK_shipout_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 { \xeCJKOffVerbAddon }
4288        \keys_set:nn { xeCJK / 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} }
4296          { \tex_XeTeXcharclass:D ##1 = \l xeCJK_tmp_int }
4297      }
4298  \bool_new:N \l xeCJK_verb_addon_bool
4299  \cs_new_eq:NN \CJKfixedspacing \xeCJKVerbAddon
```

\ xeCJK_set_verb_ exspace: I n 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 { xeCJK/verb/\CJK@family/\curr@fontshape/\f@size }
4303          {
4304            \skip_set:Nn \l xeCJK_verb_exspace_skip
4305                { \use:c { xeCJK/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  \ t e x _ f o n t d i m e n :D 2 ~ \tex_font:D }
4332              { \dim_to_fp:n {#1} }
4333          }
4334          {
4335            \tl_const:cx { xeCJK/verb/\CJK@family/\curr@fontshape/\f@size }
```

```
4336            { \skip_use:N \l xeCJK_verb_exspace_skip }
4337        }
```

```
4338   }
```

\xeCJK_set_verb_scale:nn Reduce the CJK font and save the related information.

```
4339 \cs_new_protected:Npn \xeCJK_set_verb_scale:nn #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_coor_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.

```
\cs_new_protected:Npn \__xeCJK_visible_space_fallback_auxii:N #1
  {
    \group_begin:
      \exp_args:No \__xeCJK_set_visible_space_size:n
      { \dim_use:N \tex_fontdimen:D 2 ~ \tex_font:D }
      \cs_new_protected:Npx #1
        { \group_begin: \tex_the:D \tex_font:D ^^^^2423 \group_end: }
    \group_end:
  }
\cs_new_protected:Npn \__xeCJK_set_visible_space_size:n #1
  {
    \fontencoding { \UnicodeEncodingName }
    \tl_set:Nn \f@family { lmtt }
    \selectfont
    \dim_compare:nNnF {#1} = { \tex_fontdimen:D 2 ~ \tex_font:D }
      {
        \fontsize
          {
            \dim_eval:n
              {
                \f@size pt *
                \dim_ratio:nn {#1} { \tex_fontdimen:D 2 ~ \tex_font:D }
              }
          }
          { \f@baselineskip }
        \selectfont
      }
  }
```

5.16 xeCJK Other Options

LocalConfig declares the option to load the local configuration file.

```
\keys_define:nn { xeCJK / options }
  {
    LocalConfig .choice: ,
    LocalConfig / false   .code:n =
      { \bool_gset_false:N \g_xeCJK_config_bool } ,
    LocalConfig / true    .code:n =
      {
        \bool_gset_true:N \g_xeCJK_config_bool
        \tl_gset:Nn \g_xeCJK_config_name_tl { xeCJK }
      } ,
    LocalConfig / unknown .code:n =
      {
        \bool_gset_true:N \g_xeCJK_config_bool
        \tl_gset:Nx \g_xeCJK_config_name_tl { xeCJK - \l_keys_value_tl }
      } ,
    LocalConfig           .default:n = { true }
  }
\tl_new:N \g_xeCJK_config_name_tl
\bool_new:N \g_xeCJK_config_bool
```

CJKnumber indentfirst CJKnumber and indentfirst are obsolete options.

```
\keys_define:nn { xeCJK / options }
  {
    CJKnumber         .code:n =
      { \__xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { CJKnumb } } ,
    indentfirst       .code:n =
      { \__xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { indentfirst } } ,
    normalindentfirst .code:n =
      { \__xeCJK_warning:nxx { option-deprecated } { \l_keys_key_tl } { } }
  }
```

```
\ xeCJK_msg_new:nn { option-deprecated }
  {
    The~`#1'~option~is~deprecated.\\
    \tl_if_empty:nF {#2}
      { You~may~load~the~package~`#2'~after~xeCJK~to~use~its~function.\\ }
  }
```

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.

```
\keys_define:nn { xeCJK / options }
  {
    quiet .code:n =
      {
        \msg_redirect_module:nnn { xeCJK } { warning } { info }
        \msg_redirect_module:nnn { xeCJK } { info } { none }
        \xeCJK_if_package_loaded:nF { fontspec }
          { \PassOptionsToPackage { quiet } { fontspec }
      } ,
    silent .code:n =
      {
        \msg_redirect_module:nnn { xeCJK } { warning } { none
} \msg_redirect_module:nnn { xeCJK } { info } { none }
        \xeCJK_if_package_loaded:nF { fontspec }
          { \PassOptionsToPackage { silent } { fontspec }
      } ,
    unknown .code:n =
      {
        \xeCJK_if_package_loaded:nTF { fontspec }
          { \ xeCJK_error:nx { key-unknown } { \l_keys_key_tl } }
          { \PassOptionsToPackage { \l_keys_key_tl } { fontspec }
      }
  }
\ xeCJK_msg_new:nn { key-unknown }
  {
    Sorry,~but~xeCJK/options~does~not~have~a~key~called~`#1'. \\\\
    The~key~`#1'~is~being~ignored.
  }
```

5.17 xeCJK initialization settings

\CJKsymbol \cs_new_eq:NN \CJKsymbol \use:n
\CJKpunctsymbol \cs_new_eq:NN \CJKpunctsymbol \use:n

The initialization setting of xeCJK macro package.

```
\keys_set:nn { xeCJK / options }
  {
    CJKglue       = { { \skip_horizontal:n { \c_zero_dim plus 0.08 \tex_baselineskip:D } } ,
    CJKecglue     = { ~ } ,
    xCJKecglue    == false ,
                  sync ,
                  corrected by elder man ==
    CheckSingle   = false ,
    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 } ,
```

```
      NoBreakCS          = { \footnote \footnotemark \nobreak } ,
      KaiMingPunct       = { ^^^^3002 ^^^^ff0e ^^^^ff1f ^^^^ff01 } ,
      LongPunct          = { ^^^^2014 ^^^^2e3a ^^^^2025 ^^^^2026 } ,
                         MiddlePunct= { ^^^^2013 ^^^^2014 ^^^^2e3a ^^^^2027 ^^^^00b7 ^^^^30fb ^^^^ff65
} ,
      AllowBreakBetweenPuncts = false
    }
\defaultCJKfontfeatures { Script = CJK }
```

Half-letter line connection number[15] should be half-angle width.

```
\xeCJKsetwidth { ^^^^2013 } { 0.5 em }
```

Execute the macro package option and load the fontspec macro package.

```
\cs_if_exist:NTF \ProcessKeyOptions
  { \ProcessKeyOptions [ xeCJK / options ] }
  {
    \RequirePackage { l3keys2e }
    \ProcessKeysOptions { xeCJK / options }
  }
\RequirePackage { fontspec } [ 2020/02/03 ]
```

\c xeCJK_encoding_tl Save the font encoding used by fontspec when declaring fonts.

```
\tl_const:Nx \c xeCJK_encoding_tl { \g_fontspec_encoding_tl }
```

Give a warning for the options that cannot be set by \xeCJKsetup.

```
\keys_define:nn { xeCJK / options }
  {
    LocalConfig .code:n =
      { \ xeCJK_warning:nx { option-invalid } { \l_keys_key_tl } }
  }
\ xeCJK_msg_new:nn { option-invalid }
  {
    The~`#1'~option~can~only~be~set~in~the~optional~argument~to~the\\
    \token_to_str:N \usepackage \ command~when~xeCJK~is~being~loaded.\\\\
    Please~do~not~set~it~via~the~\token_to_str:N \xeCJKsetup \ command.
  }
```

\CJKrmdefault
\CJKsfdefault
\CJKttdefault
\CJKfamilydefault

```
\tl_if_exist:NF \CJKrmdefault { \tl_gset:Nn \CJKrmdefault { rm } }
\tl_if_exist:NF \CJKsfdefault { \tl_gset:Nn \CJKsfdefault { sf } }
\tl_if_exist:NF \CJKttdefault { \tl_gset:Nn \CJKttdefault { tt } }
\tl_new:N \l xeCJK_family_default_init_tl
\cs_new_eq:NN \ xeCJK_family_default_wrap:n \use:n
\tl_set:Nx \l xeCJK_family_default_init_tl
  {
    \exp_not:N \ xeCJK_family_default_wrap:n
      {
        \tl_if_exist:NTF \CJKfamilydefault
          { \exp_not:o \CJKfamilydefault }
          { \exp_not:N \CJKrmdefault }
      }
  }
\tl_gset_eq:NN \CJKfamilydefault \l xeCJK_family_default_init_tl
```

\xeCJKsetup Set the interface of xeCJK in the introduction area or document.

```
\NewDocumentCommand \xeCJKsetup { +m }
  {
    \keys_set:nn { xeCJK / options } {#1}
    \tex_ignorespaces:D
  }
```

\xeCJKsetemboldenfactor
\xeCJKsetslantfactor

```
\NewDocumentCommand \xeCJKsetemboldenfactor { m }
    { \xeCJKsetup { EmboldenFactor = {#1} } }
\NewDocumentCommand \xeCJKsetslantfactor { m }
    { \xeCJKsetup { SlantFactor = {#1} } }
```

[15] Section 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 { CJKecglue = {#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 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 }
```

```
      { \cs_if_exist_p:N \Url@MathSetup }
      { \tl_put_right:Nn \Url@MathSetup { \xeCJK@update@fam } }
  }
```

The definition of \(in LaTeX 2_ε is

```
\def\({\relax\ifmmode\@badmath\else$\fi}
```

The \relax at the beginning of this definition is to prevent the \(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 create 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.

```
\cs_new_protected:Npn \ xeCJK_math_robust:N #1
  {
    \group_begin: \exp_args:NcNc \group_end:
      { xeCJK_math_robust_aux:NN } #1 { \cs_to_str:N #1 ~ }
  }
\cs_new_protected:Npn \ xeCJK_math_robust_aux:NN #1#2
  {
    \exp_args:Ne \str_case:nnTF { \cs_replacement_spec:N #1 }
      {
        { \x@protect #1 \protect #2 } { }
        { \protect #2 } { }
      }
      { \ xeCJK_math_robust:NN #1#2 }
      { \ xeCJK_math_robust:NN #1#1 }
  }
\cs_new_protected:Npn \ xeCJK_math_robust:NN #1#2
  {
    \str_if_eq:eeTF { \cs_argument_spec:N #2 } { }
      {
        \exp_args:No \tl_if_head_eq_meaning:nNTF {#2} \scan_stop:
          {
            \cs_gset_protected:Npx #1
              { \tl_tail:N #2 }
          }
          {
            \cs_if_eq:NNTF #1 \ensuremath
              {
                \cs_gset_protected:Npx #1
                  { \exp_not:o {#2} }
              }
              {
                \ xeCJK_warning:nxx { robust-failure }
                  { \token_to_str:N #1 } { \token_to_meaning:N #2 }
              }
          }
      }
      {
        \ xeCJK_warning:nxx { robust-failure }
          { \token_to_str:N #1 } { \token_to_meaning:N #2 }
      }
  }
\ xeCJK_msg_new:nnn { robust-failure }
  { xeCJK~can~not~make~`#1'~robust. }
  {
```

```
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
       }
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 2ε 2020/02/02, modify \fontfamily so that the main CJK font family follows the main Spanish characters.

\xeCJK@fontfamily \xeCJK@family body update, later versions can be handled with new hooks such as \@rmfamilyhook. LaTeX 2ε 2020/10/01 provides new 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
\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 } }
```

```
                { \familydefault } { \xeCJK_switch_family:e { \CJKfamilydefault } }
            }
        }
    }
}
```

⟨@@=⟩

\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}」 text, the second space can be ignored. If you use the xCJKecglue option, the first space can also be omitted. In fact, the 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.

```
\cs_new_eq:NN \xeCJK@fix@penalty \fix@penalty
\tl_replace_once:Nnn \xeCJK@fix@penalty { \@@italiccorr } { \xeCJK@italiccorr }
\tl_replace_once:Nnn \sw@slant { \fix@penalty } { \xeCJK@fix@penalty }
```

\xeCJK@italiccorr Fix skew correction and handle spaces after Chinese characters.

```
\cs_new_protected:Npn \xeCJK@italiccorr
  {
    \int_compare:nNnTF \tex_XeTeXinterchartokenstate:D > \c_zero_int
      { \xeCJK_italic_correction: }
      { \@@italiccorr }
  }
```

⟨@@=xeCJK⟩

\xeCJK_italic_correction: Fix skew correction and handle spaces after Chinese characters.

```
\cs_new_protected:Npn \xeCJK_italic_correction:
  { \ xeCJK_if_last_kern:T { \ xeCJK_italic_correction: } }
\cs_new_protected:Npn \ xeCJK_italic_correction:
  {
    \dim_case:nnF { \tex_lastkern:D }
      {
        { \ xeCJK_node:n { default } }
        {
          \xeCJK_remove_node: \tex_italiccorrection:D
          \xeCJK_make_node:n { default }
        }
        { \ xeCJK_node:n { CJK } }
        {
          \xeCJK_remove_node: \tex_italiccorrection:D
          \xeCJK_make_node:n { CJK }
          \ xeCJK_italic_correction_aux:
        }
        { \ xeCJK_node:n { CJK-space } }
        {
          \xeCJK_remove_node: \tex_italiccorrection:D
          \xeCJK_make_node:n { CJK-space }
          \ xeCJK_italic_correction_aux:
        }
      }
      { \tex_italiccorrection:D }
  }
```

\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 pro(using \exp_stop_f:)

4764 \cs_new_protected:Npn \ xeCJK_italic_correction_aux:

```
    {
                          \exp_after:wN \exp_after:wN \exp_after:wN
        \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
        \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
        \exp_after:wN \exp_after:wN \exp_after:wN \exp_after:wN
      \xeCJK_ignore_spaces:w
    }
```

\g xeCJK_xetex_allocator_int LaTeX 2_ε 2015/01/01 took over \newXeTeXintercharclass.

```
\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.

```
\ xeCJK_after_end_preamble:n
  {
    \int_compare:nNnF
      { \c xeCJK_class_begin_int + \seq_count:N \g xeCJK_new_class_seq } =
      { \g xeCJK_xetex_allocator_int }
      {
        \int_step_inline:nnn
          { \c xeCJK_class_begin_int + 1 }
          { \g xeCJK_xetex_allocator_int }
          {
            \seq_if_in:NnF \g xeCJK_new_class_seq {#1}
              { \ xeCJK_set_others_toks:n {#1} }
          }
      }
  }
\cs_new_protected:Npn \ xeCJK_set_others_toks:n #1
  {
    \int_set:cn { \ xeCJK_class_csname:n { Others } } {#1}
    \seq_map_inline:Nn \g xeCJK_CJK_class_seq
      {
        \xeCJK_copy_inter_class_toks:nnnn {##1} { Others } {##1} { NormalSpace }
        \xeCJK_copy_inter_class_toks:nnnn { Others } {##1} { NormalSpace } {##1}
        \xeCJK_app_inter_class_toks:nne {##1} { Others }
          { \xeCJK_get_inter_class_toks:nn { Default } { Others }
        \xeCJK_pre_inter_class_toks:nne { Others } {##1}
          { \xeCJK_get_inter_class_toks:nn { Others } { Default }
        \tl_if_blank:eT
          { \xeCJK_get_inter_class_toks:nn { Others } { Boundary }
          {
            \xeCJK_copy_inter_class_toks:nnn
              { Others } { Boundary } { Default } { Boundary }
          }
        \tl_if_blank:eT
          { \xeCJK_get_inter_class_toks:nn { Boundary } { Others }
          {
            \xeCJK_copy_inter_class_toks:nnn
              { Boundary } { Others } { Boundary } { Default }
          }
      }
  }
```

\ xeCJK_inactive_group_begin: The group used to protect the following disambiguation width punctuation.
\ xeCJK_inactive_group_end:

```
\cs_new_protected:Npn \ xeCJK_inactive_group_begin:
  { \group_begin: \makexeCJKinactive }
\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
\c 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.

```
\prop_const_from_keyval:Nn \c xeCJK_ambiguous_char_prop
  {
    "00B7 = \textperiodcentered \textcentereddot \textcdot ,
```

4819 "2013 = \textendash ,

```
      "2014 = \textemdash ,
      "2018 = \textquoteleft \textgrq ,
      "2019 = \textquoteright ,
      "201C = \textquotedblleft \textgrqq ,
      "201D = \textquotedblright ,
      "2025 = \texthdotfor ,
      "2026 = \textellipsis ,
      "2027 = \texthyphenationpoint ,
      "2E3A = \texttwoemdash
    }
\ xeCJK_at_end_preamble:n { \ xeCJK_patch_text_command: }
\cs_new_protected:Npn \ xeCJK_patch_text_command:
    {
      \xeCJK_if_package_loaded:nTF { xunicode }
        { \ xeCJK_patch_xunicode_ambiguous_char: }
        {
          \exp_args:Ne \ xeCJK_patch_tuenc_ambiguous_char:n
            { \UnicodeEncodingName }
          \ xeCJK_patch_tuenc_accent:
          \ xeCJK_patch_tuenc_composite:
        }
    }
\cs_new_protected:Npn \ xeCJK_patch_xunicode_ambiguous_char:
    {
      \RequirePackage { xunicode-addon }
      \prop_map_inline:Nn \c xeCJK_ambiguous_char_prop
        {
          \tl_map_inline:nn { ##2 }
            {
              \xunadd_set_begin_hook:nn { ####1 }
                { \ xeCJK_inactive_group_begin: }
              \xunadd_set_end_hook:nn { ####1 }
                { \ xeCJK_inactive_group_end: }
            }
        }
      \xunadd_append_begin_hook:n { \xeCJK_make_boundary: }
    }
\cs_new_protected:Npn \ xeCJK_patch_tuenc_ambiguous_char:n #1
    {
      \prop_map_inline:Nn \c xeCJK_ambiguous_char_prop
        {
          \tl_map_inline:nn { ##2 }
            {
              \cs_if_exist:NF ####1
                { \DeclareTextSymbol ####1 { ##1} { ##1 } }
              \ xeCJK_patch_ambiguous_char:nN {#1} ####1
            }
        }
    }
\cs_new_protected:Npn \ xeCJK_patch_ambiguous_char:nN #1#2
    {
      \exp_args:Ne \ xeCJK_patch_ambiguous_char:nn
        { #1 \token_to_str:N #2 }
        { #1 - #2 }
    }
\cs_new_protected:Npx \ xeCJK_patch_ambiguous_char:nNn #1#2#3
    {
      \exp_not:N \exp_args:Ne
      \exp_not:N \ xeCJK_patch_ambiguous_char:nn
        {
          \c_backslash_str #1
          \exp_not:N \token_to_str:N #2 -
          \exp_not:N \token_to_str:N #3
        }
        { #1 - #2#3 }
    }
\cs_new_protected:Npn \ xeCJK_patch_ambiguous_char:nn #1#2
```

```
  {
    \cs_if_free:cF {#1}
      { \exp_args:Nc \ xeCJK_patch_ambiguous_char:Nn {#1} {#2} }
  }
\cs_new_protected:Npn \ xeCJK_patch_ambiguous_char:Nn #1#2
  {
    \token_if_chardef:NTF #1
      {
        \prop_gput:Nne \c xeCJK_ambiguous_slot_prop {#2}
          { \int_eval:n {#1} }
        \cs_set_protected:Npx #1
          { \ xeCJK_ambiguous_char:n { \tex_Uchar:D #1 }
      }
      {
        \prop_gput:Nne \c xeCJK_ambiguous_slot_prop {#2}
          { \int_eval:n { \exp_after:wN ` #1 } }
        \cs_set_protected:Npx #1
          { \ xeCJK_ambiguous_char:n { \exp_not:o {#1} } }
      }
  }
\cs_new_protected:Npn \ xeCJK_ambiguous_char:n #1
  {
    \int_compare:nNnTF \tex_XeTeXinterchartokenstate:D > \c_zero_int
      { \ xeCJK_inactive_group_begin: #1 \ xeCJK_inactive_group_end: }
      {#1}
  }
\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, needs to make the font return to the western state

```
\cs_new_protected:Npn \xeCJK_text_composite_patch:
  {
    \str_if_eq:eeT { \f@encoding } { \UnicodeEncodingName }
      { \xeCJK_make_boundary: }
  }
```

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.

```
\cs_new_protected:Npn \ xeCJK_patch_tuenc_composite:
  {
    \cs_set_nopar:Npn \@text@composite@x
      {
        \xeCJK_text_composite_patch:
        \cs_if_exist_use:NF
      }
  }
```

\ 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.

```
\group_begin:
\char_set_catcode_other:n { "A0 }
\cs_new_protected:Npn \ xeCJK_patch_tuenc_accent:
  {
    \cs_set_protected_nopar:Npn \add@unicode@accent ##1 ##2
      {
        \tl_if_blank:nTF { ##2 } { ^^a0 } { ##2 }
        \tex_Uchar:D \tex_numexpr:D ##1 \scan_stop:
      }
  }
\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 \c xeCJK_middle_dot_prop are in conflict.

```
\DeclareTextComposite{\r}{T1}{u}{183}
\DeclareTextSymbol{\cyrchvcrs}{T2A}{183}
\DeclareTextSymbol{\cyrchldsc}{T2B}{183}
\DeclareTextSymbol{\cyrabhha}{T2C}{183}
\DeclareTextSymbol\textvibyy{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.

```
\prop_const_from_keyval:Nn \c xeCJK_middle_dot_prop
  {
    T2A = \cyrchvcrs ,
    T2B = \cyrchldsc ,
    T2C = \cyrabhha ,
    X2 = \cyrchldsc ,
    TS1 = \textperiodcentered ,
    LY1 = \textperiodcentered ,
    T1 = \r u ,
    T4 = \B t ,
    T5 = \` \ecircumflex
  }
\ xeCJK_at_end_preamble:n { \ xeCJK_patch_middle_dot: }
\cs_new_protected:Npn \ xeCJK_patch_middle_dot:
  {
    \prop_map_inline:Nn \c xeCJK_middle_dot_prop
      { \ xeCJK_patch_middle_dot:nw { ##1 } ##2 \q_stop }
    \ xeCJK_patch_ambiguous_char:nNn { T5 } \` { \^ - e }
  }
\cs_new_protected:Npn \ xeCJK_patch_middle_dot:nw #1#2#3 \q_stop
  {
    \tl_if_empty:nTF {#3}
      { \ xeCJK_patch_ambiguous_char:nN {#1} #2 }
      { \ xeCJK_patch_ambiguous_char:nNn {#1} #2 {#3} }
  }
```

The symbol \ding{183} of the pifont macro package also has a conflict.

```
\ xeCJK_package_hook:nn { pifont }
  {
    \RenewDocumentCommand \Pifont { m }
      { \makexeCJKinactive \usefont { U } {#1} { m } { n } }
  }
```

\ 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:

```
\ xeCJK_package_hook:nn { unicode-math }
  {
    \prop_const_from_keyval:Nn \c xeCJK_um_ambiguous_char_prop
      {
        "00B7 = \cdotp ,
        "2025 = \enleadertwodots ,
        "2026 = \unicodeellipsis
      }
    \cs_new_protected:Npn \ xeCJK_save_um_char:
      {
        \cs_set_protected:Npx \ xeCJK_restore_um_char:
          {
            \prop_map_function:NN
              \c xeCJK_um_ambiguous_char_prop
              \ xeCJK_restore_um_char_aux:nn
          }
      }
    \cs_new_eq:NN \  xeCJK_restore_um_char: \prg_do_nothing:
```

```
    \cs_new:Npn \ xeCJK_restore_um_char_aux:nn #1#2
      {
        \ xeCJK_gset_mathcodenum:nn
          { \int_value:w #1 }
          { \int_value:w \tex_Umathcodenum:D #1 }
      }
    \cs_new_protected:Npn \ xeCJK_gset_mathcodenum:nn #1#2
      {
        \int_compare:nNnF { \tex_Umathcodenum:D #1 } = {#2}
          { \tex_global:D \tex_Umathcodenum:D #1 = #2 ~ }
      }
  }
```

_xeCJK_patch_microtype_get_ slot: Compatible with microtype.

```
\cs_new_protected:Npn \ xeCJK_patch_microtype_get_slot:
  {
    \cs_new_eq:NN \xeCJK@original@get@slot \MT@get@slot@
    \cs_set_eq:NN \MT@get@slot@ \xeCJK@microtype@get@slot
    \cs_set_eq:NN \MT@warn@unknown@once \use_none:n
  }
\cs_new_protected_nopar:Npn \xeCJK@microtype@get@slot
  {
    \int_compare:nNnT \MT@char < \c_zero_int
      { \ xeCJK_get_ambiguous_slot: }
    \xeCJK@original@get@slot
  }
\cs_new_protected:Npn \ xeCJK_get_ambiguous_slot:
  {
    \prop_get:NeNT \c xeCJK_ambiguous_slot_prop
      { \MT@encoding - \tex_the:D \MT@toks } \l xeCJK_tmp_tl
      { \cs_set_eq:NN \MT@char \l xeCJK_tmp_tl }
  }
\cs_new_protected:Npn \xeCJK@microtype@restore@pickupfont
  { \ xeCJK_gadd_font_initial_hook:n { \MT@ltx@pickupfont }
\ xeCJK_package_hook:nn { microtype }
  {
    \cs_if_free:NF \MT@get@slot@
      { \ xeCJK_patch_microtype_get_slot: }
    \MT@addto@setup { \xeCJK@microtype@restore@pickupfont }
  }
```

Simple handling of compatibility issues with hyperref macro packages.

```
\ xeCJK_package_hook:nn { hyperref }
  {
    \pdfstringdefDisableCommands
      {
        \ xeCJK_gobble_CJKfamily:
        \xeCJK_cs_clear:N \ xeCJK_inactive_group_begin:
        \xeCJK_cs_clear:N \ xeCJK_inactive_group_end:
        \xeCJK_cs_clear:N \makexeCJKinactive
        \xeCJK_cs_clear:N \xeCJK_text_composite_patch:
      }
  }
```

When the cprotect macro package is detected to be introduced, the \outer definition of the \cprotect macro is cancelled.

```
\ xeCJK_package_hook:nn { cprotect }
  {
    \cs_if_free:NF \icprotect
      { \exp_after:wN \tex_let:D \cs:w cprotect \cs_end: \icprotect }
  }
```

Automatically load xeCJK-listings after the listings macro package.

```
\ xeCJK_package_hook:nn { listings }
  { \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.

```
\ xeCJK_package_hook:nn { everysel }
  {
    \cs_if_exist:NF \@EverySelectfont@Legacy
      { \cs_undefine:c { ver@CJK . \c xeCJK_package_ext_tl } }
  }
```

\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.

```
\ctex_at_begin_package:nn { CJKnumb }
  {
    \tl_new:N \l xeCJK_CJK_version_tl
    \tl_set_eq:Nc \l xeCJK_CJK_version_tl { ver@CJK . \c xeCJK_package_ext_tl }
    \tl_set:cn { ver@CJK . \c xeCJK_package_ext_tl } { 9999/99/99 }
    \cs_new_protected:Npn \CJKaddEncHook #1#2
      {
        \str_if_eq:nnT {#1} { \CJK@UnicodeEnc }
          {
            \group_begin:
              \cs_set_eq:NN \Unicode \xeCJK_unicode_char:nn
              \cs_set_eq:NN \def \xdef
              #2
            \group_end:
            \str_gset:Nn \CJK@tenthousand       { ^^^^4e07 }
            \str_gset:Nn \CJK@hundredmillion { ^^^^4ebf }
            \tl_if_exist:NF \CJK@UnicodeEnc
              { \tl_const:Nn \CJK@UnicodeEnc { UTF8 } }
            \cs_if_exist:NF \Unicode
              { \cs_new_eq:NN \Unicode \xeCJK_unicode_char:n          n }
          }
      }
    \cs_new:Npn \xeCJK_unicode_char:nn #1#2
      { \tex_Uchar:D \tex_numexpr:D (#1) * 256 + (#2) \scan_stop: }
  }
\ctex_at_end_package:nn { CJKnumb }
  { \tl_set_eq:cN { ver@CJK . \c xeCJK_package_ext_tl } \l xeCJK_CJK_version_tl }
```

Finally the local configuration file is introduced.

```
\bool_if:NT \g xeCJK_config_bool
  {
    \ExplSyntaxOff
    \file_input:n { \g xeCJK_config_name_tl .cfg }
    \ExplSyntaxOn
  }
```

〈/package〉

5.19 xeCJKfntef

〈*fntef〉

```
\PassOptionsToPackage { normalem } { ulem }
\DeclareOption* { \PassOptionsToPackage { \CurrentOption } { ulem } }
\ProcessOptions \scan_stop:
```

```
\RequirePackage { xeCJK }
\RequirePackage { ulem }
```

```
\addto@hook \UL@hook { \xeCJK_hook_for_ulem: }
```

\xeCJK_hook_for_ulem:

```
\cs_new_protected:Npn \xeCJK_hook_for_ulem:
  {
    \xeCJK_ulem_detect_node:
    \l xeCJK_ulem_text_format_tl
```

5092 \bool_if:NF \l xeCJK_ulem_hook_used_bool

```
      {
        \bool_set_true:N \l xeCJK_ulem_hook_used_bool
        \ xeCJK_ulem_hook:
      }
    \xeCJK_ulem_begin_node:
  }
\cs_new_protected:Npn \ xeCJK_ulem_hook:
  {
    \ xeCJK_ulem_initial:
    \bool_if:NT \l xeCJK_ulem_subtract_bool
      {
        \xeCJK_swap_cs:NN \UL@leaders \xeCJK_ulem_leaders:
        \cs_set_eq:NN \ xeCJK_ulem_var_leaders: \xeCJK_ulem_var_leaders:
        \cs_set_eq:NN \xeCJK_ulem_right_skip: \ xeCJK_ulem_right_skip:
      }
    \bool_if:NT \l xeCJK_ulem_hidden_bool
      { \cs_set_eq:NN \UL@putbox \ xeCJK_ulem_hidden_box: }
    \bool_if:NTF \l xeCJK_ulem_skip_bool
      {
        \cs_set_eq:NN \ xeCJK_ulem_putbox: \UL@putbox
        \cs_set_eq:NN \ xeCJK_ulem_hskip_aux:n \ xeCJK_ulem_hskip:n
      }
      {
        \xeCJK_swap_cs:NN \xeCJK_punct_hskip:n \xeCJK_ulem_punct_hskip:n
        \xeCJK_cs_clear:N \ xeCJK_ulem_skip_punct_begin:
        \xeCJK_cs_clear:N \ xeCJK_ulem_skip_punct_end:
      }
    \xeCJK_glue_to_skip:nN
      {
        \cs_set_eq:NN \ \tex_space:D
        \cs_set_eq:NN \penalty \tex_penalty:D
        \cs_set_eq:NN \hskip \skip_horizontal:N
        \CJKglue
      } \l xeCJK_ccglue_skip
    \xeCJK_glue_to_skip:nN
      {
        \cs_set_eq:NN \\tex_space:D
        \cs_set_eq:NN \penalty \tex_penalty:D
        \cs_set_eq:NN \hskip \skip_horizontal:N
        \CJKecglue
      } \l xeCJK_ecglue_skip
    \xeCJK_glue_to_skip:nN { \xeCJK_space_glue: } \l xeCJK_space_skip
    \cs_set_protected:Npn \CJKglue
      { \ xeCJK_ulem_glue:n \l xeCJK_ccglue_skip }
    \cs_set_protected:Npn \CJKecglue
      { \ xeCJK_ulem_glue:n \l xeCJK_ecglue_skip }
    \cs_set_protected:Npn \xeCJK_space_glue:
      { \ xeCJK_ulem_glue:n \l xeCJK_space_skip }
    \cs_set_eq:NN \xeCJK_punct_node:N \use_none:n
    \cs_set_eq:NN \xeCJK_if_last_punct:TF \use_ii:nn
    \keys_set:nn { xeCJK / options }
      { CheckFullRight = false , xCJKecglue = false }
  }
\skip_new:N \l xeCJK_space_skip
\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

```
\cs_new_protected:Npn \xeCJK_ulem_word:nw #1 ~
  {
    \ xeCJK_ulem_start:w #1 ~
    \exp_after:wN \if_meaning:w \exp_after:wN \UL@end #1
      \exp_after:wN \ xeCJK_ulem_end:
    \else:
      \exp_after:wN \ xeCJK_ulem_loop:nw
    \fi:
  }
\cs_new_protected:Npn \ xeCJK_ulem_end:
```

```
{
          \c_group_end_token
        \c_group_end_token
        \tex_unskip:D \tex_unskip:D \tex_unskip:D
        \xeCJK_ulem_right_skip:
      \xeCJK_ulem_group_end:
      \xeCJK_ulem_right_node:
      \int_set:Nn \tex_spacefactor:D { \UL@spfactor }
    }
\cs_new_protected:Npn \ xeCJK_ulem_loop:nw
    {
      \reverse_if:N \if_mode_math:
        \reverse_if:N \if_dim:w \tex_lastskip:D = \c_zero_dim
          \skip_gset_eq:NN \UL@skip \tex_lastskip:D
          \tex_unskip:D
          \UL@stop \UL@leaders
        \fi:
      \fi:
      \xeCJK_ulem_word:nw \prg_do_nothing:
    }
\cs_new_protected:Npn \ xeCJK_ulem_start:w
    { \exp_after:wN \UL@start }
\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.

\xeCJK_ulem_detect_node:

```
\cs_new_protected:Npn \xeCJK_ulem_left:
    {
      \xeCJK_ulem_left_node:
      \xeCJK_make_group_tag:
    }
\cs_new_eq:NN \xeCJK_ulem_left_node: \prg_do_nothing:
\cs_new_protected:Npn \xeCJK_ulem_detect_node:
    {
      \scan_stop:
      \dim_compare:nNnTF \tex_lastkern:D = \c_zero_dim
        {
          \xeCJK_cs_clear:N \xeCJK_ulem_left_node:
          \xeCJK_cs_clear:N \xeCJK_ulem_begin_node:
          \cs_set_eq:NN \ xeCJK_ulem_hskip:n \ xeCJK_ulem_hskip:n
        }
        {
          \dim_set_eq:NN \l xeCJK_tmp_dim \tex_lastkern:D
          \tex_unkern:D
          \dim_compare:nNnTF \tex_lastkern:D = { - \l xeCJK_tmp_dim }
            {
              \tex_unkern:D
              \cs_set_protected:Npx \xeCJK_ulem_left_node:
                {
                  \tex_kern:D - \dim_use:N \l xeCJK_tmp_dim \exp_stop_f:
                  \tex_kern:D     \dim_use:N \l xeCJK_tmp_dim \exp_stop_f:
                }
              \cs_set_protected:Npn \xeCJK_ulem_begin_node:
                { { \xeCJK_make_node:n { ulem-begin } }
              \cs_set_eq:NN \ xeCJK_ulem_hskip:n \ xeCJK_ulem_hskip_first:n
            }
            {
              \tex_kern:D \l xeCJK_tmp_dim
              \xeCJK_cs_clear:N \xeCJK_ulem_left_node:
              \xeCJK_cs_clear:N \xeCJK_ulem_begin_node:
              \cs_set_eq:NN \ xeCJK_ulem_hskip:n \xeCJK_ulem_hskip:n
            }
        }
    }
\xeCJK_declare_node:n { ulem-begin }
\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

\xeCJK_ulem_hskip:n

There is no need to underline.

```
\cs_new_protected:Npn \ xeCJK_ulem_hskip_first:n #1
  {
    \xeCJK_if_last_node:nTF { ulem-begin }
      {
        \xeCJK_remove_node:
        \skip_horizontal:n {#1}
      }
      { \xeCJK_ulem_hskip:n {#1} }
    \cs_set_eq:NN \ xeCJK_ulem_hskip:n \xeCJK_ulem_hskip:n
  }
\cs_new_eq:NN \ xeCJK_ulem_hskip:n \ xeCJK_ulem_hskip_first:n
\cs_new_protected:Npn \xeCJK_ulem_hskip:n #1
  { { { \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:

```
\cs_new_protected:Npn \xeCJK_ulem_right:
  {
    \scan_stop:
    \dim_compare:nNnTF \tex_lastkern:D = \c_zero_dim
      { \xeCJK_cs_gclear:N \xeCJK_ulem_right_node: }
      {
        \dim_compare:nNnTF \tex_lastkern:D = { 3sp }
          { \xeCJK_cs_gclear:N \xeCJK_ulem_right_node: }
          {
            \exp_args:No \tex_unkern:D
            \ xeCJK_ulem_right_aux:n { \dim_use:N \tex_lastkern:D }
          }
      }
  }
\cs_new_protected:Npn \ xeCJK_ulem_right_aux:n #1
  {
    \dim_compare:nNnTF \tex_lastkern:D = { - #1 }
      {
        \tex_unkern:D
        \cs_gset_protected:Npn \xeCJK_ulem_right_node:
          {
            \tex_kern:D - #1 \exp_stop_f:
            \tex_kern:       D#1 \exp_stop_f:
          }
        \tl_gset:Nx \UL@spfactor { \int_use:N \tex_spacefactor:D }
      }
      {
        \tex_kern:D #1 \exp_stop_f:
        \xeCJK_cs_gclear:N \xeCJK_ulem_right_node:
      }
  }
\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 to let the left side have spacing.

```
\cs_new_protected:Npn \xeCJK_ulem_leaders:
  { \ xeCJK_ulem_var_leaders: }
\cs_new_protected:Npn \xeCJK_ulem_var_leaders:
  {
    \scan_stop:
    \skip_if_eq:nnF { \UL@skip } { \c_zero_skip }
      {
        \UL@leadtype \skip_horizontal:n { \UL@skip + \UL@pixel }
        \skip_horizontal:n { - \UL@pixel }
        \cs_gset_eq:NN \  xeCJK_ulem_var_leaders: \xeCJK_ulem_leaders:
      }
  }
\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.

```
\cs_new_eq:NN \xeCJK_ulem_right_skip: \prg_do_nothing:
\cs_new_protected:Npn \ xeCJK_ulem_right_skip:
  {
    \int_case:nn { \tex_lastnodetype:D }
      {
        { \c xeCJK_hlist_node }   { \ xeCJK_ulem_right_skip_hbox: }
        { \c xeCJK_glue_node }    { \c xeCJK_ulem_right_skip_glue: }
        { \c xeCJK_penalty_node } { \ xeCJK_ulem_right_skip_penalty: }
      }
  }
\cs_new_protected:Npn \ xeCJK_ulem_right_skip_hbox:
  {
    \box_set_to_last:N \l xeCJK_tmp_box
    \ xeCJK_if_last_kern:TF
      { \ xeCJK_ulem_right_skip_kern: }
      { \ xeCJK_ulem_right_skip_glue: }
    \box_use_drop:N \l xeCJK_tmp_box
  }
\cs_new_protected:Npn \ xeCJK_ulem_right_skip_kern:
  {
    \dim_set:Nn \l xeCJK_tmp_dim { - \box_wd:N \l xeCJK_tmp_box }
    \dim_compare:nNnT \tex_lastkern:D = \l xeCJK_tmp_dim
      {
        \tex_unkern:D
        \ xeCJK_ulem_right_skip_glue:
        \tex_kern:D \l xeCJK_tmp_dim
      }
  }
\cs_new_protected:Npn \ xeCJK_ulem_right_skip_glue:
  {
    \skip_if_eq:nnT { \tex_lastskip:D } { - \UL@pixel }
      {
        \tex_unskip:D
        \skip_set:Nn \l xeCJK_tmp_skip { \tex_lastskip:D - \UL@pixel }
        \tex_unskip:D
        \UL@leadtype \skip_horizontal:N \l xeCJK_tmp_skip
      }
  }
\cs_new_protected:Npn \ xeCJK_ulem_right_skip_penalty:
  {
    \int_set_eq:NN \l xeCJK_tmp_int \tex_lastpenalty:D
    \tex_unpenalty:D
    \ xeCJK_if_last_hlist:T
      { \ xeCJK_ulem_right_skip_hbox: }
    \tex_penalty:D \l xeCJK_tmp_int
  }
```

\ xeCJK_ulem_hidden_ box: Draw only the line, do not output the box.

```
\cs_new_protected:Npn \ xeCJK_ulem_hidden_box:
  {
    \tl_if_empty:NF \UL@start
      {
        \box_set_ht:Nn \l xeCJK_hidden_box { \box_ht:N \UL@box }
        \box_set_dp:Nn \l xeCJK_hidden_box { \box_dp:N \UL@box }
        \box_use:N \l xeCJK_hidden_box
        \xeCJK_no_break:
        \xeCJK_ulem_hskip:n { \box_wd:N \UL@box }
        \box_use:N \l xeCJK_hidden_box
      }
  }
\box_new:N \l xeCJK_hidden_box
\hbox_set:Nn \l xeCJK_hidden_box { }
```

_xeCJK_ulem_skip_punct_begin: Let the underscore skip the punctuation setting.
_xeCJK_ulem_skip_punct_end:

```
\cs_new_protected:Npn \__xeCJK_ulem_skip_punct_begin:
  {
    \cs_set_eq:NN \UL@putbox \__xeCJK_ulem_skip_putbox:
    \cs_set_eq:NN \xeCJK_ulem_hskip:n \skip_horizontal:n
  }
\cs_new_protected:Npn \__xeCJK_ulem_skip_punct_end:
  {
    \cs_set_eq:NN \UL@putbox \__xeCJK_ulem_putbox:
    \cs_set_eq:NN \xeCJK_ulem_hskip:n \__xeCJK_ulem_hskip_aux:n
  }
\cs_new_eq:NN \__xeCJK_ulem_putbox: \UL@putbox
\cs_new_protected:Npn \__xeCJK_ulem_skip_putbox:
  {
    \tl_if_empty:NF \UL@start
      { \box_use_drop:N \UL@box }
  }
```

_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.

```
\cs_new_protected:Npn \__xeCJK_ulem_initial:
  {
    \__xeCJK_ulem_swap_cs:NN
    \xeCJK_FullLeft_and_Default:       \__xeCJK_ulem_FullLeft_and_Default:
    \xeCJK_FullLeft_and_CJK:          \__xeCJK_ulem_FullLeft_and_CJK:
    \xeCJK_FullLeft_and_Boundary:     \__xeCJK_ulem_FullLeft_and_Boundary:
    \xeCJK_FullRight_and_Default:     \__xeCJK_ulem_FullRight_and_Default:
    \xeCJK_FullRight_and_CJK:         \__xeCJK_ulem_FullRight_and_CJK:
    \xeCJK_FullRight_and_Boundary:    \__xeCJK_ulem_FullRight_and_Boundary:
    \xeCJK_CJK_and_CJK:N              \__xeCJK_ulem_CJK_and_CJK:N
    \xeCJK_CJK_and_Boundary:w         \__xeCJK_ulem_CJK_and_Boundary:w
    \xeCJK@fix@penalty                \__xeCJK_ulem_fix_penalty:
    \__xeCJK_punct_breakable_kern:n       \__xeCJK_ulem_punct_breakable_kern:n
    \__xeCJK_Default_and_FullLeft_glue:N  \__xeCJK_ulem_Default_and_FullLeft_glue:N
    \__xeCJK_Default_and_FullRight_glue:N \__xeCJK_ulem_Default_and_FullRight_glue:N
    \__xeCJK_CJK_and_FullLeft_glue:N      \__xeCJK_ulem_CJK_and_FullLeft_glue:N
    \__xeCJK_CJK_and_FullRight_glue:N     \__xeCJK_ulem_CJK_and_FullRight_glue:N
    \__xeCJK_Boundary_and_FullLeft_glue:N \__xeCJK_ulem_Boundary_and_FullLeft_glue:N
    \q_recursion_tail \q_nil \q_recursion_stop
    \seq_map_inline:Nn \g__xeCJK_CJK_sub_class_seq
      {
        \seq_map_inline:Nn \g__xeCJK_CJK_sub_class_seq
          {
            \str_if_eq:nnTF {##1} {####1}
              {
                \xeCJK_inter_class_toks:nnn { CJK } { CJK/##1 }
                  { \__xeCJK_ulem_between_CJK_blocks:nnN { CJK } {##1} }
                \xeCJK_inter_class_toks:nnn { CJK/##1 } { CJK/##1 }
                  { \__xeCJK_ulem_between_CJK_blocks:nnN { CJK } {##1} }
              }
              {
                \xeCJK_inter_class_toks:nnn { CJK/##1 } { CJK/####1 }
                  { \__xeCJK_ulem_between_CJK_blocks:nnN {##1} {####1} }
              }
          }
      }
  }
\cs_new_protected:Npn \__xeCJK_ulem_swap_cs:NN #1#2
  {
    \quark_if_recursion_tail_stop:N #1
    \xeCJK_swap_cs:NN #1#2
    \__xeCJK_ulem_swap_cs:NN
  }
```

\xeCJK_if_ulem_patch:TF In the underline state, the ulem macro package uses the definition of \UL@hrest to recover \\, 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.

```
\cs_new:Npn \xeCJK_if_ulem_patch:TF
  {
    \if_meaning:w \  \   LA@space
      \exp_after:wN \use_ii:nn
    \else:
      \exp_after:wN \use_i:nn
    \fi:
  }
```

\xeCJK_ulem_CJK_and_Boundary:w

```
\cs_new_protected:Npn \ xeCJK_ulem_CJK_and_Boundary:w
  {
    \xeCJK_if_ulem_patch:TF
      {
        \xeCJK_peek_catcode_ignore_spaces:NTF \c_math_toggle_token
          { \xeCJK_class_group_end: \CJKecglue }
          {
            \bool_if:NTF \l xeCJK_peek_ignore_spaces_bool
              { \ xeCJK_ulem_peek_math:w }
              { \ xeCJK_ulem_group_end:n { CJK } }
          }
      }
      { \ xeCJK_ulem_CJK_and_Boundary:w }
  }
\cs_new_protected:Npn \ xeCJK_ulem_group_end:n #1
  {
    \xeCJK_class_group_end: \UL@stop
    \UL@start { \xeCJK_make_node:n {#1} }
    \xeCJK_make_group_tag:
  }
```

\ 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] .

```
\cs_new_protected:Npn \ xeCJK_ulem_peek_math:w
  {
    \cs_set_eq:NN \ xeCJK_ulem_start:w \ xeCJK_ulem_exp_stop:w
    \exp_after:wN \peek_after:Nw
    \exp_after:wN \ xeCJK_ulem_peek_math_branches:w
    \exp:w \exp_end_continue_f:w
  }
\cs_new_protected:Npn \ xeCJK_ulem_peek_math_branches:w
  {
    \token_if_math_toggle:NTF \l_peek_token
      { \xeCJK_class_group_end: \CJKecglue }
      { \ xeCJK_ulem_group_end:n { CJK-space } }
  }
\cs_new_protected:Npn \ xeCJK_ulem_exp_stop:w
  {
    \cs_if_eq:NNTF \UL@start \@empty
      { \exp_after:wN \exp_stop_f: }
      { \ e x p _ a f t e r :wN \UL@start
} }
```

\ xeCJK_ulem_fix_ penalty:

```
\cs_new_protected:Npn \ xeCJK_ulem_fix_penalty:
  {
    \xeCJK_if_ulem_patch:TF
      { \fix@penalty }
      { \ xeCJK_ulem_fix_penalty: }
  }
```

\ xeCJK_ulem_CJK_and_ CJK:N

```
\cs_new_protected:Npn \ xeCJK_ulem_CJK_and_CJK:N
  {
    \xeCJK_if_ulem_patch:TF
      {
```

[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      }
\_xeCJK_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      }
\_xeCJK_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      }
\_xeCJK_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      }
\_xeCJK_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      }
\_xeCJK_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
                    \ xeCJK_punct_rule:NN \c xeCJK_right_tl \g xeCJK_last_punct_tl 5573
\xeCJK_class_group_end: \UL@stop \xeCJK_no_break:
5574                \ xeCJK_punct_glue:NN \c xeCJK_left_tl \g xeCJK_last_punct_tl
5575              }
5576              { \xeCJK_class_group_end: \UL@stop }
5577            \ xeCJK_ulem_skip_punct_end:
5578            \xeCJK_no_break:
5579            \UL@start
5580          }
5581          { \ xeCJK_ulem_FullLeft_and_Default: }
5582      }
```

```
\_xeCJK_ulem_FullLeft_and_Boundary:
\cs_new_protected:Npn \_xeCJK_ulem_FullLeft_and_Boundary:
  {
    \xeCJK_if_ulem_patch:TF
      {
        \_xeCJK_punct_if_middle:NTF \g_xeCJK_last_punct_tl
          {
            \xeCJK_get_punct_bounds:No \c_xeCJK_left_tl \g_xeCJK_last_punct_tl
            \_xeCJK_punct_rule:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
            \xeCJK_class_group_end: \UL@stop \xeCJK_no_break:
            \_xeCJK_punct_glue:NN \c_xeCJK_left_tl \g_xeCJK_last_punct_tl
          }
          { \xeCJK_class_group_end: \UL@stop }
        \_xeCJK_ulem_skip_punct_end:
        \xeCJK_no_break:
        \UL@start
        \tex_ignorespaces:D
      }
      { \_xeCJK_ulem_FullLeft_and_Boundary: }
  }

\_xeCJK_ulem_FullLeft_and_CJK:
\cs_new_protected:Npn \_xeCJK_ulem_FullLeft_and_CJK:
  {
    \xeCJK_if_ulem_patch:TF
      {
        \xeCJK_FullLeft_and_Default:
        \_xeCJK_ulem_class_group_begin:
        \xeCJK_select_font:
      }
      { \_xeCJK_ulem_FullLeft_and_CJK: }
  }

\_xeCJK_ulem_FullRight_and_Default:
\cs_new_protected:Npn \_xeCJK_ulem_FullRight_and_Default:
  {
    \xeCJK_if_ulem_patch:TF
      {
        \_xeCJK_punct_rule:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
        \xeCJK_class_group_end:
        \UL@stop
        \_xeCJK_punct_glue:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
        \_xeCJK_ulem_skip_punct_end:
        \UL@start
      }
      { \_xeCJK_ulem_FullRight_and_Default: }
  }

\_xeCJK_ulem_FullRight_and_Boundary:
\cs_new_protected:Npn \_xeCJK_ulem_FullRight_and_Boundary:
  {
    \xeCJK_if_ulem_patch:TF
      {
        \_xeCJK_punct_rule:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
        \xeCJK_class_group_end:
        \UL@stop
        \_xeCJK_punct_glue:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
        \_xeCJK_ulem_skip_punct_end:
        \UL@start
        \tex_ignorespaces:D
      }
      { \_xeCJK_ulem_FullRight_and_Boundary: }
  }

\_xeCJK_ulem_FullRight_and_CJK:
\cs_new_protected:Npn \_xeCJK_ulem_FullRight_and_CJK:
  {
    \xeCJK_if_ulem_patch:TF
      {
                \_xeCJK_punct_rule:NN \c_xeCJK_right_tl \g_xeCJK_last_punct_tl
        \xeCJK_class_group_end:
        \UL@stop
                \_xeCJK_punct_glue:NN \c_xeCJK_right_tl \g_xeCJK_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      }
\ xeCJK_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      }
\ xeCJK_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.
\ xeCJK_ulem_ccglue

```
5672 \cs_new_protected:Npn \ xeCJK_ulem_glue:n #1
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
\tex_currentgrouptype:D 5692                L
\ 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 } }
```

\xeCJK_ulem_group_begin: \xeCJK_ulem_group_end: \xeCJK_ulem_on:n

```
5698 \cs_new_protected:Npn \xeCJK_ulem_group_begin:
5699      {
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.

```
\NewDocumentCommand \xeCJKfntefon { s t- s o }
  {
    \mode_leave_vertical:
    \xeCJK_ulem_boot:NNNn #1#2#3 {#4}
    \xeCJK_ulem_on:n
  }
```

\CJKunderline
```
\NewDocumentCommand \CJKunderline { s t- s o }
  {
    \xeCJK_ulem_group_begin:
      \xeCJK_fntef_boot:nnNNNn { underline } { uline } #1#2#3 {#4}
      \xeCJK_fntef_initial:nnn
        { \l xeCJK_uline_depth_tl }
        { \l xeCJK_uline_sep_tl }
        {
          \l xeCJK_uline_format_tl
          \tex_vrule:D
            height \dim_eval:n { \l xeCJK_uline_thickness_tl }
            depth \c_zero_dim
            width .2em
        }
      \xeCJK_ulem_on:n
  }
\NewDocumentCommand \varCJKunderline { }
  { \CJKunderline - }
```

\CJKunderwave
```
\NewDocumentCommand \CJKunderwave { s t- s o }
  {
    \xeCJK_ulem_group_begin:
      \xeCJK_fntef_boot:nnNNNn { underwave } { uwave } #1#2#3 {#4}
      \xeCJK_fntef_initial:nnn
        { \l xeCJK_uwave_depth_tl }
        { \l xeCJK_uwave_sep_tl }
        { \l xeCJK_uwave_format_tl \l xeCJK_uwave_symbol_tl }
      \xeCJK_ulem_on:n
  }
```

\CJKunderdblline
```
\NewDocumentCommand \CJKunderdblline { s t- s o }
  {
    \xeCJK_ulem_group_begin:
      \xeCJK_fntef_boot:nnNNNn { underdblline } { udbline } #1#2#3 {#4}
      \xeCJK_fntef_initial:nnn
        { \l xeCJK_udbline_depth_tl }
        { \l xeCJK_udbline_sep_tl }
        {
          \l xeCJK_udbline_format_tl
          \vbox_top:n
            {
              \tex_hrule:D
                height \dim_eval:n { \l xeCJK_udbline_thickness_tl }
                depth \c_zero_dim
                width .2em
              \tex_kern:D \dim_eval:n { \l xeCJK_udbline_gap_tl }
              \tex_hrule:D
                height \dim_eval:n { \l xeCJK_udbline_thickness_tl }
                depth \c_zero_dim
                width .2em
            }
        }
      \xeCJK_ulem_on:n
  }
```

\CJKsout
```
\NewDocumentCommand \CJKsout { s t- s o }
  {
    \xeCJK_ulem_group_begin:
      \xeCJK_fntef_boot:nnNNNn { sout } { sout } #1#2#3 {#4}
      \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 }
```

```
    \tl_set_eq:Nc \l xeCJK_ulem_text_format_tl { l xeCJK_#2_text_format_tl }
  }
\cs_new_protected:Npn \xeCJK_ulem_boot:NNNn #1#2#3#4
  {
    \bool_lazy_or:nnT {#1} {#3}
      { \bool_set_false:N \l xeCJK_ulem_skip_bool }
    \bool_if:NT #2
      { \bool_set_true:N \l xeCJK_ulem_subtract_bool }
    \tl_if_novalue:nF {#4}
      { \keys_set:nn { xeCJK / options / ulem } {#4} }
  }
```

\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.

```
\cs_new_protected:Npn \xeCJK_fntef_initial:n
  {
    \bool_if:NTF \l xeCJK_nest_bool
      { \ xeCJK_warning:n { fntef-nesting } }
      {
        \bool_set_true:N \l xeCJK_nest_bool
        \ xeCJK_restore_shipout_fntef:
      }
    \xeCJK_fntef_sbox:n
  }
\cs_new_protected:Npn \xeCJK_fntef_initial:nn #1
  {
    \xeCJK_fntef_initial:n {#1}
    \bool_if:NF \l xeCJK_fntef_bool
      { \dim_zero:N \l xeCJK_fntef_dim }
    \markoverwith
  }
\cs_new_protected:Npn \xeCJK_fntef_initial:nnn #1#2#3
  {
    \xeCJK_fntef_initial:n {#3}
    \bool_if:NF \l xeCJK_fntef_bool
      {
        \bool_set_true:N \l xeCJK_fntef_bool
        \dim_set:Nn \l xeCJK_fntef_dim {#1}
      }
    \markoverwith
      {
        \box_move_down:nn
          { \l xeCJK_fntef_dim + \box_ht:N \l xeCJK_fntef_box }
          { \box_use:N \l xeCJK_fntef_box }
      }
    \dim_set:Nn \l xeCJK_fntef_dim { #2 + \box_dp:N \ULC@box }
  }
\box_new:N \l xeCJK_fntef_box
\cs_new_eq:NN \xeCJKfntefbox \l xeCJK_fntef_box
\bool_new:N \l xeCJK_nest_bool
\bool_new:N \l xeCJK_fntef_bool
\ xeCJK_msg_new:nn { fntef-nesting }
  { 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.

```
\cs_new_eq:NN \l xeCJK_fntef_dim \ULdepth
```

\xeCJK_fntef_sbox:n is similar to \hcoffin_set:Nn and LaTeX 2ε's \sbox function to 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.

```
\cs_new_protected:Npn \xeCJK_fntef_sbox:n #1
  {
```

```
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.

```
\keys_define:nn { xeCJK / options }
  {
    underdot / symbol          .tl_set:N = \l xeCJK_udot_symbol_tl ,
    underdot / depth           .tl_set:N = \l xeCJK_udot_depth_tl ,
    underdot / sep             .tl_set:N = \l xeCJK_udot_sep_tl ,
    underdot / format          .tl_set:N == \l xeCJK_udot_format_tl ,
                                            sync ,
                                            corrected by elder man ==
    underdot / textformat      .tl_set:N = \l xeCJK_udot_text_format_tl ,
    underdot / boxdepth        .tl_set:N = \l xeCJK_udot_boxdepth_tl ,
    symbol / sep               .tl_set:N = \l xeCJK_symbol_sep_tl ,
    symbol / boxdepth          .tl_set:N = \l xeCJK_symbol_boxdepth_tl ,
    symbol / textformat        .tl_set:N = \l xeCJK_symbol_text_format_tl ,
    underline / skip          .bool_set:N = \l xeCJK_uline_skip_bool ,
    underline / hidden        .bool_set:N = \l xeCJK_uline_hidden_bool ,
    underline / subtract      .bool_set:N = \l xeCJK_uline_subtract_bool ,
    underline / thickness       .tl_set:N = \l xeCJK_uline_thickness_tl ,
    underline / depth           .tl_set:N = \l xeCJK_uline_depth_tl ,
    underline / sep             .tl_set:N = \l xeCJK_uline_sep_tl ,
    underline / format          .tl_set:N = \l xeCJK_uline_format_tl ,
    underline / textformat      .tl_set:N = \l xeCJK_uline_text_format_tl ,
    underdblline / skip       .bool_set:N = \l xeCJK_udbline_skip_bool ,
    underdblline / hidden     .bool_set:N = \l xeCJK_udbline_hidden_bool ,
    underdblline / subtract .bool_set:N = \l xeCJK_udbline_subtract_bool ,
underdblline / thickness        .tl_set:N = \l xeCJK_udbline_thickness_tl ,
    underdblline / depth        .tl_set:N = \l xeCJK_udbline_depth_tl ,
    underdblline / sep          .tl_set:N = \l xeCJK_udbline_sep_tl ,
    underdblline / format       .tl_set:N = \l xeCJK_udbline_format_tl ,
    underdblline / textformat .tl_set:N = \l xeCJK_udbline_text_format_tl ,
    underdblline / gap          .tl_set:N = \l xeCJK_udbline_gap_tl ,
    underwave / skip          .bool_set:N = \l xeCJK_uwave_skip_bool ,
    underwave / hidden        .bool_set:N = \l xeCJK_uwave_hidden_bool ,
    underwave / subtract      .bool_set:N = \l xeCJK_uwave_subtract_bool ,
    underwave / symbol          .tl_set:N = \l xeCJK_uwave_symbol_tl ,
    underwave / depth           .tl_set:N = \l xeCJK_uwave_depth_tl ,
    underwave / sep             .tl_set:N = \l xeCJK_uwave_sep_tl ,
    underwave / format          .tl_set:N = \l xeCJK_uwave_format_tl ,
    underwave / textformat      .tl_set:N = \l xeCJK_uwave_text_format_tl ,
    sout / skip               .bool_set:N = \l xeCJK_sout_skip_bool ,
    sout / hidden             .bool_set:N = \l xeCJK_sout_hidden_bool ,
    sout / subtract           .bool_set:N = \l xeCJK_sout_subtract_bool ,
    sout / thickness            .tl_set:N = \l xeCJK_sout_thickness_tl ,
    sout / height               .tl_set:N = \l xeCJK_sout_height_tl ,
    sout / format               .tl_set:N = \l xeCJK_sout_format_tl ,
    sout / textformat           .tl_set:N = \l xeCJK_sout_text_format_tl ,
    xout / skip               .bool_set:N = \l xeCJK_xout_skip_bool ,
    xout / hidden             .bool_set:N = \l xeCJK_xout_hidden_bool ,
    xout / subtract           .bool_set:N = \l xeCJK_xout_subtract_bool ,
    xout / format               .tl_set:N = \l xeCJK_xout_format_tl ,
    xout / textformat           .tl_set:N = \l xeCJK_xout_text_format_tl ,
    ulem / skip               .bool_set:N = \l xeCJK_ulem_skip_bool ,
    ulem / hidden             .bool_set:N = \l xeCJK_ulem_hidden_bool ,
    ulem / subtract           .bool_set:N = \l xeCJK_ulem_subtract_bool ,
    ulem / sep                  .tl_set:N = \l xeCJK_ulem_sep_tl ,
    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 . ,
```

```
    underdot / depth          = 0.20 em ,
    underdot / sep            = 0.04 em ,
    symbol / sep              = \c_zero_dim ,
    underline / skip          = true ,
    underline / thickness     = \ULthickness ,
    underline / depth         = 0.20 em ,
    underline / sep           = 0.07 em ,
    underdblline / skip       = true ,
                              =
                              s
                              y
                              n
                              c,
                              c
                              o
                              rr
                              e
                              ct
                              e
                              d
                              b
                              y
                              el
                              d
                              e
                              r
                              m
                              a
                              n
                              =
                              =
    underdblline / thickness  = \ULthickness ,
    underdblline / depth      = 0.20 em ,
    underdblline / sep        = 0.17 em ,
    underdblline / gap        = 1.1 pt ,
    underwave / skip          = true ,
    underwave / symbol        = \sixly \tex_char:D 58 \exp_stop_f: ,
    underwave / depth         = 0.20 em ,
    underwave / sep           = 0.00 em ,
    sout / skip               = true ,
    sout / thickness          = \ULthickness ,
    sout / height             = 0.35 em ,
    xout / skip               = true
}
```

\CJKunderanysymbol

```
\NewDocumentCommand \CJKunderanysymbol { o m m m }
{
  \xeCJK_under_symbol:nnnnnnn { symbol } { symbol } {#1} {#2} {#3} {#4}
  \tex_ignorespaces:D
}
```

\CJKunderdot \CJKunderdot is a special case of \CJKunderanysymbol. CJKfntef originally used the mathematical symbol \cdot, here it is changed to the more appropriate .

```
\NewDocumentCommand \CJKunderdot { o m }
{
  \xeCJK_under_symbol:nnnnnnn { underdot } { udot }
    {#1}
    { \l xeCJK_udot_depth_tl }
    { \l xeCJK_udot_format_tl \l xeCJK_udot_symbol_tl }
    {#2}
  \tex_ignorespaces:D
}
```

\xeCJK_under_symbol:nnnnnnn When in the underline, we break the underline first and set the underline symbol outside the group.

```
\cs_new_protected:Npn \xeCJK_under_symbol:nnnnnnn
{
  \xeCJK_if_ulem_patch:TF
    { \ xeCJK_under_symbol_auxi:nnnnnnn }
    { \ xeCJK_under_symbol_auxii:nnnnnnn }
}
```

```
\cs_new_protected:Npn \ xeCJK_under_symbol_auxi:nnnnnnn #1#2#3#4#5#6
  {
    \xeCJK_ulem_right: \UL@stop
    \group_begin:
      \xeCJK_under_symbol_initial:nnnnnn {#1} {#2} {#3} {#4} {#5}
      \use:c { l xeCJK_#2_text_format_tl }
      \UL@start \xeCJK_ulem_right_node:
        #6
      \xeCJK_ulem_right: \UL@stop
    \group_end:
    \UL@start \xeCJK_ulem_right_node:
  }
\cs_new_protected:Npn \ xeCJK_under_symbol_auxii:nnnnnnn #1#2#3#4#5#6
  {
    \mode_leave_vertical:
    \group_begin:
      \xeCJK_under_symbol_initial:nnnnnn {#1} {#2} {#3} {#4} {#5}
      \ xeCJK_under_symbol_text_format:c { l xeCJK_#2_text_format_tl }
```

```
      #6
      \xeCJK_ulem_right:
    \group_end:
    \xeCJK_ulem_right_node:
  }
\cs_new_protected:Npn \xeCJK_under_symbol_initial:nnnnnn #1#2#3#4#5
  {
    \tl_if_novalue:nF {#3}
      { \keys_set:nn { xeCJK / options / #1 } {#3} }
    \xeCJK_fntef_sbox:n {#5}
    \bool_if:NTF \l xeCJK_fntef_bool
      { \xeCJK_make_under_symbol:n { \l xeCJK_fntef_dim } }
      {
        \bool_set_true:N \l xeCJK_fntef_bool
        \xeCJK_make_under_symbol:n {#4}
      }
    \tl_if_empty:cF { l xeCJK_#2_boxdepth_tl }
      {
        \box_set_dp:Nn \l xeCJK_under_symbol_box
          { \use:c { l xeCJK_#2_boxdepth_tl } }
      }
    \dim_set:Nn \l xeCJK_fntef_dim
      { \use:c { l xeCJK_#2_sep_tl } + \box_dp:N \l xeCJK_under_symbol_box }
    \xeCJK_swap_cs:NN \CJKsymbol \xeCJK_under_CJKsymbol:N
    \ xeCJK_restore_shipout_CJKsymbol:
  }
\cs_new_protected:Npn \ xeCJK_under_symbol_text_format:N #1
  {
    \tl_if_empty:NF #1
      { \xeCJK_ulem_right: #1 \xeCJK_ulem_right_node: }
  }
\cs_generate_variant:Nn \ xeCJK_under_symbol_text_format:N { c }
\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.

```
\cs_new_protected:Npn \xeCJK_make_under_symbol:n #1
  {
    \hbox_set:Nn \l xeCJK_under_symbol_box
      {
        \box_move_down:nn { #1 + \box_ht:N \l xeCJK_fntef_box }
          {
            \hbox_to_zero:n
              {
                \xeCJK_select_font:
                \tex_kern:D \tex_fontcharwd:D \tex_font:D "4E00 \exp_stop_f:
                \tex_hss:D \box_use:N \l xeCJK_fntef_box \tex_hss:D
              }
          }
      }
  }
```

_xeCJK_restore_shipout_ CJKsymbol: \CJKunderdot changes to \CJKsymbol will affect the header and footer, so you need to handle it carefully.

```
\cs_new_protected:Npn \ xeCJK_restore_shipout_CJKsymbol:
  {
    \tl_put_right:Nn \l xeCJK_fntef_shipout_tl
      { \xeCJK_swap_cs:NN \CJKsymbol \xeCJK_under_CJKsymbol:N }
    \ xeCJK_restore_shipout_fntef:
    \xeCJK_cs_clear:N \ xeCJK_restore_shipout_CJKsymbol:
  }
\cs_new_protected:Npn \ xeCJK_restore_shipout_fntef:
  {
    \tl_put_right:Nn \l xeCJK_fntef_shipout_tl
      {
        \bool_set_false:N \l xeCJK_fntef_bool
        \dim_zero:N \l xeCJK_fntef_dim
      }
```

```
    \xeCJK_cs_clear:N \ xeCJK_restore_shipout_fntef:
  }
\tl_new:N \l xeCJK_fntef_shipout_tl
\xeCJK_add_to_shipout:n { \l xeCJK_fntef_shipout_tl }
```

\xeCJK_under_CJKsymbol:N The CJKsymbol box is placed on the left side of the Chinese character, which is easier to handle the state transfer problem.

```
\cs_new_protected:Npn \ xeCJK_under_CJKsymbol:N
  {
    \box_use:N \l xeCJK_under_symbol_box
    \xeCJK_no_break: \ xeCJK_under_CJKsymbol:N
  }
```

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.

```
\ NewDocumentEnvironment { CJKfilltwosides } { O { c } m }
  {
    \use:e { \exp_not:N \minipage [#1] { \dim_eval:n {#2} } }
    \cs_set_eq:NN \CJKglue \xeCJK_fntef_hfilll:
  }
  {
    \endminipage
    \ignorespacesafterend
  }
\NewDocumentEnvironment { CJKfilltwosides* } { O { c } m +b }
  {
    \mode_leave_vertical:
    \cs_set_eq:NN \CJKglue \xeCJK_fntef_hfilll:
    \tl_set:Nn \arraystretch { 1 }
    \cs_if_free:NF \extrarowheight
      { \cs_set_eq:NN \extrarowheight \c_zero_dim }
    \use:e { \ xeCJK_fill_two_sides:nnn {#1} { \dim_eval:n {#2} } } {#3}
  }
  { \ignorespacesafterend }
\cs_new_protected:Npn \ xeCJK_fill_two_sides:nnn #1#2#3
  {
    \dim_compare:nNnTF {#2} > \c_zero_dim
      {
        \hbox_set:Nn \l xeCJK_tmp_box
          { \tabular [#1] { @ { } c @ { } #3 \endtabular }
        \dim_compare:nNnTF {#2} > { \box_wd:N \l xeCJK_tmp_box }
          { \tabular [#1] { @ { } p {#2} @ { } } #3 \endtabular }
          { \box_use:N \l xeCJK_tmp_box }
      }
      { \tabular [#1] { @ { } c @ { } #3 \endtabular }
  }
```

\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.

```
\cs_new_protected:Npn \xeCJK_fntef_hfilll:
  { \skip_horizontal:N \c xeCJK_filll_skip }
\skip_const:Nn \c xeCJK_filll_skip { \c_zero_dim plus 1 filll }

⟨/fntef⟩
```

5.20 xeCJK-listings

Supports the listings macro package, following the handling of lltjp-listings in the luatexja macro package.

```
⟨*listings⟩
```

```
\DeclareOption* { \PassOptionsToPackage { \CurrentOption } { xeCJK } }
\ProcessOptions \scan_stop:
```

```
\RequirePackage { xeCJK }
\RequirePackage { listings }
\lst@AddToHook { Init } { \ xeCJK_listings_initial_hook: }
\lst@AddToHook { SelectCharTable } { \ xeCJK_listings_toks_hook: }
\lst@AddToHook { OutputBox }
  {
    \tl_set_eq:NN \l_xeCJK_punct_style_tl \c xeCJK_punct_style_plain_tl
    \l xeCJK_restore_listings_toks_tl
    \ xeCJK_listings_output_CM:
  }
\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.

```
\cs_new_protected:Npn \ xeCJK_listings_initial_hook:
  {
    \tex_noindent:D
    \bool_gset_false:N \g xeCJK_listings_CM_bool
    \tl_put_left:Nn \lst@numberstyle { \l xeCJK_restore_listings_toks_tl }
    \xeCJK_add_to_shipout:n { \l xeCJK_restore_listings_toks_tl }
    \lst@ifbreaklines
      \cs_set_eq:NN \  xeCJK_listings_CJK_toks_hook: \ xeCJK_listings_breaklines_toks:
      \tl_if_empty:NF \lst@prebreak
        { \tl_put_left:Nn \lst@prebreak { \l xeCJK_restore_listings_toks_tl } }
      \tl_if_empty:NF \lst@postbreak
        { \tl_put_left:Nn \lst@postbreak { \l xeCJK_restore_listings_toks_tl } }
    \fi:
    \int_set:Nn \l xeCJK_listings_max_char_int
      { \lst@ifec 255 \else: 127 \fi: }
  }
\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.

```
\cs_new_protected:Npn \ xeCJK_listings_toks_hook:
  {
    \tl_clear:N \l xeCJK_restore_listings_toks_tl
    \seq_map_function:NN
      \g xeCJK_class_seq \ xeCJK_backup_inter_class_toks:n
    \seq_map_inline:Nn \g xeCJK_non_CJK_class_seq
      {
        \str_if_eq:nnF { ##1 } { Boundary }
          {
            \ xeCJK_inter_class_toks:nnn { Boundary } { ##1 }
              { \ xeCJK_listings_process_Default:nN { ##1 } }
          }
      }
    \xeCJK_inter_class_toks:nnn { Boundary } { CM }
      { \ xeCJK_listings_process_CM:nN { 0 } }
    \ xeCJK_listings_CJK_toks_hook:
  }
```

\xeCJK_backup_inter_class_ toks:n Note that assigning null values to \XeTeXinterchartoks will cause XETEX to crash!

```
\cs_new_protected:Npn \ xeCJK_backup_inter_class_toks:n #1
  {
    \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}
```

```
            {
              \tl_if_empty:NTF \l xeCJK_tmp_tl
                { \exp_not:N \prg_do_nothing: }
                { \exp_not:o \l xeCJK_tmp_tl }
            }
        }
    }
\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:

```
\cs_new_protected:Npn \ xeCJK_listings_CJK_toks_hook:
  {
    \xeCJK_inter_class_toks:nnn { Boundary } { CJK }
      { \ xeCJK_listings_process_CJK:nN { 2 } }
    \xeCJK_inter_class_toks:nnn { Boundary } { FullLeft }
      { \ xeCJK_listings_process_CJK:nN { 2 } }
    \xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
      { \ xeCJK_listings_process_CJK:nN { 2 } }
    \xeCJK_inter_class_toks:nnn { Boundary } { HangulJamo }
      { \ xeCJK_listings_process_CJK:nN { 2 } }
    \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
      {
        \xeCJK_inter_class_toks:nnn { Boundary } { CJK/##1 }
          { \ xeCJK_listings_process_CJK:nN { 2 } }
      }
  }
\cs_new_protected:Npn \ xeCJK_listings_breaklines_toks:
  {
    \xeCJK_inter_class_toks:nnn { Boundary } { CJK }
      { \ xeCJK_listings_process_breaklines_CJK:nN { 2 } }
    \ xeCJK_inter_class_toks:nnn { Boundary } { HangulJamo }
      { \ xeCJK_listings_process_breaklines_CJK:nN { 2 } }
    \ xeCJK_inter_class_toks:nnn { Boundary } { FullLeft }
      { \ xeCJK_listings_process_FullLeft:nN { 2 } }
    \xeCJK_inter_class_toks:nnn { Boundary } { FullRight }
      { \ xeCJK_listings_process_FullRight:nN { 2 } }
    \seq_map_inline:Nn \g xeCJK_CJK_sub_class_seq
      {
        \xeCJK_inter_class_toks:nnn { Boundary } { CJK/##1 }
          { \ xeCJK_listings_process_breaklines_CJK:nN { 2 } }
      }
  }
```

_xeCJK_listings_process_Default:nN For characters whose \charcode is greater than 255, process them according to \catcode.

```
\cs_new_protected:Npn \ xeCJK_listings_process_Default:nN #1#2
  {
    \int_compare:nNnTF
      { \xeCJK_token_value_charcode:N #2 } > \l xeCJK_listings_max_char_int
      {
        \token_if_letter:NTF #2
          { \lst@ProcessLetter #2 }
          { \lst@ProcessOther #2 }
      }
      { \ xeCJK_listings_output_Default:nN {#1} #2 }
  }
```

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:.

```
\cs_new_protected:Npn \ xeCJK_listings_output_Default:nN #1#2
  {
    \group_begin:
      \xeCJK_clear_inter_class_toks:nn { Boundary } {#1}
      \xeCJK_inter_class_toks:nnn {#1} { Boundary } { \group_end: }
      #2
      \scan_stop:
  }
```

__xeCJK_listings_process_CJK:nN Processing of CJK character classes.

```
\cs_new_protected:Npn \__xeCJK_listings_process_CJK:nN #1#2
  {
    \token_if_letter:NTF #2
      { \__xeCJK_listings_process_letter:nN {#1} #2 }
      { \__xeCJK_listings_process_other:nN {#1} #2 }
  }
```

__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.

```
\cs_new_protected:Npn \__xeCJK_listings_append:nN #1#2
  {
    \int_add:Nn \lst@length { #1 - 1 }
    \lst@Append #2
  }
```

__xeCJK_listings_process_letter:nN Distinguish Chinese characters and western letters in the letter class.
__xeCJK_listings_process_other:nN

```
\cs_new_protected:Npn \__xeCJK_listings_process_letter:nN
  {
    \lst@whitespacefalse
    \bool_if:NTF \l__xeCJK_listings_letter_bool
      { \lst@lettertrue }
      {
        \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
        \bool_set_true:N \l__xeCJK_listings_letter_bool
      }
    \__xeCJK_listings_append:nN
  }
\bool_new:N \l__xeCJK_listings_letter_bool
\cs_new_protected:Npn \__xeCJK_listings_process_other:nN #1#2
  {
    \lst@whitespacefalse
    \bool_if:NTF \l__xeCJK_listings_letter_bool
      {
        \lst@Output \lst@letterfalse
        \bool_set_false:N \l__xeCJK_listings_letter_bool
      }
      { \lst@ifletter \lst@Output \lst@letterfalse \fi: }
    \cs_set_eq:NN \lst@lastother #2
    \__xeCJK_listings_append:nN {#1} #2
  }
```

__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

```
\cs_new_protected:Npn \__xeCJK_listings_process_breaklines_CJK:nN
  {
    \lst@whitespacefalse
    \bool_if:NTF \l__xeCJK_listings_letter_bool
      {
        \int_compare:nNnF \l__xeCJK_listings_flag_int = 2 { \lst@Output }
        \lst@lettertrue
      }
      {
        \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
        \bool_set_true:N \l__xeCJK_listings_letter_bool
      }
    \int_set_eq:NN \l__xeCJK_listings_flag_int \c_one_int
    \__xeCJK_listings_append:nN
  }
\cs_new_protected:Npn \__xeCJK_listings_process_FullLeft:nN #1#2
```

```
6286    {
6287      \lst@whitespacefalse
```

```
      \bool_if:NTF \l xeCJK_listings_letter_bool
        {
          \int_compare:nNnF \l xeCJK_listings_flag_int = 2
            {
              \int_compare:nNnTF \l xeCJK_listings_flag_int = 3
               { \bool_if:NT \l xeCJK_punct_breakable_bool { \lst@Output } }
               { \lst@Output }
            }
          \lst@lettertrue
        }
        {
          \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi :
          \bool_set_true:N \l xeCJK_listings_letter_bool
        }
      \int_set:Nn \l xeCJK_listings_flag_int { 2 }
      \ xeCJK_listings_append:nN {#1} #2
    }
\cs_new_protected:Npn \ xeCJK_listings_process_FullRight:nN #1#2
    {
      \lst@whitespacefalse
      \bool_if:NTF \l xeCJK_listings_letter_bool
        {
          \int_compare:nNnT \l xeCJK_listings_flag_int < 2
            { \ xeCJK_punct_if_long:NT #2 { \lst@Output } }
          \lst@lettertrue
        }
        {
          \lst@ifletter \lst@Output \else: \lst@OutputOther \lst@lettertrue \fi:
          \bool_set_true:N \l xeCJK_listings_letter_bool
        }
      \int_set:Nn \l xeCJK_listings_flag_int { 3 }
      \ xeCJK_listings_append:nN {#1} #2
    }
\int_new:N \l xeCJK_listings_flag_int
```

\lst@AppendLetter \lst@AppendOther

```
\cs_set_protected:Npn \lst@AppendLetter
    {
      \bool_if:NTF \l xeCJK_listings_letter_bool
        {
          \lst@Output \lst@lettertrue
          \bool_set_false:N \l xeCJK_listings_letter_bool
        }
        { \reverse_if:N \lst@ifletter \lst@OutputOther \lst@lettertrue \fi: }
      \lst@ifbreaklines \int_zero:N \l xeCJK_listings_flag_int \fi:
      \lst@Append
    }
\cs_set_protected:Npn \lst@AppendOther
    {
      \bool_if:NTF \l xeCJK_listings_letter_bool
        {
          \lst@Output \lst@letterfalse
          \bool_set_false:N \l xeCJK_listings_letter_bool
        }
        { \lst@ifletter \lst@Output \lst@letterfalse \fi: }
      \lst@ifbreaklines \int_zero:N \l xeCJK_listings_flag_int \fi:
      \tex_futurelet:D \lst@lastother \lst@Append
    }
```

_xeCJK_listings_process_CM:nN CM class is processed as letter without adding \lst@length.

```
\cs_new_protected:Npn \ xeCJK_listings_process_CM:nN
    {
      \reverse_if:N \lst@ifflexible
        \bool_gset_true:N \g xeCJK_listings_CM_bool
      \fi:
      \ xeCJK_listings_process_letter:nN
    }
```

\xeCJK_listings_output_CM: When using the columns=fixed option, listings will add \hss between each character in the output box, which breaks XƎTEX to combine the basic word and the combination mark correctly.

```
\cs_new_protected:Npn \xeCJK_listings_output_CM:
  {
    \reverse_if:N \lst@ifflexible
      \bool_if:NT \g xeCJK_listings_CM_bool
        {
          \bool_gset_false:N \g xeCJK_listings_CM_bool
          \xeCJK_cs_clear:N \lst@FillOutputBox
          \cs_set_eq:NN \CJKglue \tex_hss:D
        }
    \fi:
  }
\bool_new:N \g xeCJK_listings_CM_bool
```

__xeCJK_listings_peek_active_loop:TF \lstinline 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.

```
\cs_new_protected:Npn \__xeCJK_listings_peek_active_loop:TF #1#2#3
  {
    \token_if_active:NTF #3
      { #1#3 }
      {
        \token_if_cs:NTF #3
          { #2#3 }
          {
            \int_compare:nNnTF { `#3 } > { \l xeCJK_listings_max_char_int }
              { \__xeCJK_listings_peek_active_loop:TF { #1#3 } { #2#3 } } { #2#3 }
          }
      }
  }
\cs_set_eq:NN \lst@IfNextCharActive \__xeCJK_listings_peek_active_loop:TF
```

\xeCJK_listings_rescan:Nn When \lstinline is used in the parameter, listings will use a loop to take the characters in \lstinline 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.

```
\cs_new_protected:Npn \xeCJK_listings_rescan:Nn #1#2
  {
    \__xeCJK_listings_set_escape:
    \tl_set:Nn \l xeCJK_tmp_tl {#2}
    \__xeCJK_listings_escape_backslash:
    \tl_set_rescan:Nno #1 { } { \l xeCJK_tmp_tl }
  }
\cs_new_protected:Npn \xeCJK_listings_inside_convert:nw #1 ~ \@empty
  {
    \xeCJK_listings_rescan:Nn \l xeCJK_tmp_tl {#1}
    \tl_put_right:No \lst@arg { \l xeCJK_tmp_tl }
}
\cs_set_eq:NN \lst@InsideConvert@ \xeCJK_listings_inside_convert:nw
\cs_new_protected:Npn \xeCJK_listings_inline_group:w
  {
    \exp_after:wN \xeCJK_listings_inline_group:n
    \exp_after:wN { \if_int_compare:w `} = \c_zero_int \fi:
  }
\cs_set_eq:NN \lst@InlineGJ \xeCJK_listings_inline_group:w
\cs_new_protected:Npn \xeCJK_listings_inline_group:n #1
  {
    \xeCJK_listings_rescan:Nn \lst@arg {#1}
    \lst@InlineGJEnd
  }
```

\ 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.

```
\group_begin:
\cs_set:Npn \ xeCJK_tmp:w #1
  {
    \group_end:
    \cs_new_protected:Npn \ xeCJK_listings_set_escape:
      { \xeCJK_swap_cs:NN #1 \ xeCJK_listings_escape:N }
    \cs_new_protected:Npn \ xeCJK_listings_escape:N ##1
      { \cs_if_eq:NNTF #1 ##1 { \ xeCJK_listings_escape:N } {##1} }
  }
\use:n
  {
    \char_set_catcode_active:N \\
    \ xeCJK_tmp:w
  }
  { \ }
```

__xeCJK_listings_escape_ backslash: \catcode of 12 \ requires double-case escape.

```
\cs_new_protected:Npx \ xeCJK_listings_escape_backslash:
  {
    \tl_replace_all:Nnn \exp_not:N \l xeCJK_tmp_tl
      { \c_backslash_str }
      { \c_backslash_str \c_backslash_str }
  }
```

⟨/listings⟩

⟨@@=xunadd⟩

5.21 xunicode-addon

⟨*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.

```
\bool_lazy_or:nnF
  { \sys_if_engine_xetex_p: }
  { \sys_if_engine_luatex_p: }
  {
    \msg_new:nnnn { xunicode-addon } { xetex-luatex }
      { this~package~requires~either~XeTeX~or~LuaTeX~to~function.}
      {
        You~must~change~your~typesetting~engine~to,~e.g.,\\
        "xelatex"~or~"lualatex"~instead~of~plain~"latex"~or~"pdflatex".
      }
    \msg_critical:nn { xunicode-addon } { xetex-luatex }
  }
\RequirePackage { xparse }
```

The macro package option is the name of the code.

```
\clist_new:N \g xunadd_encname_clist
\tl_if_exist:NT \UTFencname
  { \clist_gput_right:Nx \g xunadd_encname_clist { \UTFencname } }
\DeclareOption*
  { \clist_gput_right:No \g xunadd_encname_clist \CurrentOption }
```

```
\ProcessOptions \scan_stop:
```

If xunicode has already been called, reset the encoding command corresponding to \UTFencname at the end of the macro package. Otherwise set \UTFencname as LuaLaTeX is used, some settings are needed to make xunicode available.

```
\@ifpackageloaded { xunicode } { }
  {
    \clist_get:NNF \g xunadd_encname_clist \UTFencname
      {
        \cs_if_exist:NTF \UnicodeEncodingName
          { \tl_set:Nx \UTFencname { \UnicodeEncodingName } }
          {
            \sys_if_engine_xetex:TF
              { \tl_set:Nn \UTFencname { EU1 } }
              { \tl_set:Nn \UTFencname { EU2 } }
          }
        \clist_gset_eq:NN \g xunadd_encname_clist \UTFencname
      }
    \sys_if_engine_xetex:TF
      { \RequirePackage { xunicode } }
      {
        \cs_set_eq:NN \ xunadd_tmp:w \XeTeXpicfile
        \cs_set_eq:NN \XeTeXpicfile \prg_do_nothing:
        \RequirePackage { xunicode }
        \cs_set_eq:NN \XeTeXpicfile \ xunadd_tmp:w
      }
  }
\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.

```
\RenewDocumentCommand \ReloadXunicode { m }
  {
    \clist_set:Nx \l xunadd_encname_clist {#1}
    \ xunadd_reload:N \l xunadd_encname_clist
  }
\cs_new_protected:Npn \ xunadd_reload:N #1
  {
    \cs_set_eq:NN \ xunadd_tmp:w \iftipaonetoken
    \cs_set_eq:NN \iftipaonetoken \scan_stop:
    \use:e
      {
        \ExplSyntaxOff
        \char_set_catcode_letter:n { 64 }
        \exp_not:N \clist_map_function:NN \exp_not:N #1 \ xunadd_reload_aux:n
        \bool_if:NTF \l kernel_expl_bool
          { \ExplSyntaxOn }
          { \ExplSyntaxOff }
        \char_set_catcode:nn { 64 } { \char_value_catcode:n { 64 }
      }
    \cs_set_eq:NN \iftipaonetoken \ xunadd_tmp:w
  }
\cs_new_protected:Npn \ xunadd_reload_aux:n #1
  {
    \cs_if_exist:cTF { T@ #1 }
      {
        \tl_set:Nn \UTFencname {#1}
        \clist_if_in:NnF \g xunadd_encname_clist {#1}
          { \clist_gput_right:Nn \g xunadd_encname_clist {#1} }
        \file_input:n { xunicode.sty }
        \file_input:n { xunicode-extra.def }
      }
      { \msg_error:nnn { xunicode-addon } { encoding-unknown } {#1} }
  }
\clist_new:N \l xunadd_encname_clist
\msg_new:nnn { xunicode-addon } { encoding-unknown }
  { Encoding~scheme~"#1"~unknown. }
  {
```

```
      You~may~use \\\\
      \token_to_str:N \usepackage [ #1 , \encodingdefault ] \{fontenc\} \\\\
      before~xunicode-addon~or~xunicode.
    }
```

\DeclareUTFmathsymbols After defining text symbols as \protected macros, a little extra processing is needed for compatibility with hyperref's bookmark function.

```
\RenewDocumentCommand \DeclareUTFmathsymbols { m }
  {
    \bool_if:NT \l xunadd_math_as_UTF_text_bool
      {
        \seq_map_inline:Nn \l xunadd_math_as_UTF_text_seq
          { \ xunadd_declare_math_as_UTF_text:n {##1} }
        \bool_set_false:N \l xunadd_math_as_UTF_text_bool
      }
  }
\seq_new:N \l xunadd_math_as_UTF_text_seq
\seq_set_from_clist:Nn \l xunadd_math_as_UTF_text_seq
  { hbar , Finv , aleph , beth , gimel , daleth , Game }
\bool_new:N \l xunadd_math_as_UTF_text_bool
\RenewDocumentCommand \UseMathAsText { }
  {
    \math@s@text@true
    \bool_set_true:N \l xunadd_math_as_UTF_text_bool
  }
\@onlypreamble \UseMathAsText
\cs_new_protected:Npn \ xunadd_declare_math_as_UTF_text:n #1
  {
    \cs_if_exist:cTF {#1}
      {
        \cs_new_eq:cc { keepmathUTF #1 } {#1}
        \cs_gset_protected:cpx {#1}
          {
            \exp_not:N \mode_if_math:TF
              { \exp_not:c { keepmathUTF #1 } }
              { \exp_not:c { text #1 } }
          }
        \tl_put_right:Nx \l xunadd_hyperref_hook_tl
          { \cs_set_eq:NN \exp_not:c { #1} \exp_not:c { text #1 } }
      }
      { \cs_new:cpx {#1} { \exp_not:c { text #1 } }
  }
\tl_new:N \l xunadd_hyperref_hook_tl
\AtBeginDocument
  {
    \cs_if_free:NF \pdfstringdefDisableCommands
      { \pdfstringdefDisableCommands { \l xunadd_hyperref_hook_tl }
  }
```

\ xunadd_glyph_if_exist_p:n Determines if the character is present in the current font.
\ xunadd_glyph_if_exist:nTF

```
\prg_new_conditional:Npnn \ xunadd_glyph_if_exist:n #1 { p , T , F , TF }
  {
    \tex_iffontchar:D \tex_font:D \tex_numexpr:D #1 \scan_stop:
      \prg_return_true: \else: \prg_return_false: \fi:
  }
```

\UndeclareUTFcharacter undeclare UTFcharacter command #3 under encoding #1.

```
\RenewDocumentCommand \UndeclareUTFcharacter { O { \UTFencname } m m }
  {
    \ xunadd_if_csname:nTF {#3}
      { \UndeclareTextCommand {#3} }
      { \exp_args:Nc \UndeclareTextCommand { \tl_to_str:n {#3} } }
      {#1}
  }
```

\UndeclareUTFcomposite Uncode the composite symbol command #3{#4} under #1.

```
\RenewDocumentCommand \UndeclareUTFcomposite { O { \UTFencname } m m m m }
  {
    \ xunadd_if_csname:nTF {#3}
      { \ xunadd_undeclare_composite:Nnnn #3 }
      { \exp_args:Nc \ xunadd_undeclare_composite:Nnnn { \tl_to_str:n {#3} } }
      {#1} {#4} {#2}
  }
\cs_new_protected:Npn \ xunadd_undeclare_composite:Nnnn #1#2#3#4
  { \cs_undefine:c { \ xunadd_composite_cs:Nnn #1 {#2} {#3} } }
```

\ xunadd_composite_ cs:Nnn
\ xunadd_composite_cs:nnn

```
\ cs_new:Npx \ xunadd_composite_cs:Nnn #1#2#3
  { \c_backslash_str #2  \ e x p _ n o t :N \token_to_str:N #1 - \exp_not:N \tl_to_str:n {#3} }
\cs_new:Npx \ xunadd_composite_cs:nnn #1#2#3
  { \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 xunicide uses the following definition.

```
\DeclareUTFcharacter[\UTFencname]{x0149}{'n}
```

```
\prg_new_conditional:Npnn \ xunadd_if_csname:n #1 { TF }
  {
    \tl_if_single_token:nTF {#1}
      {
        \token_if_cs:NTF #1
          { \prg_return_true: }
          {
            \token_if_active:NTF #1
              { \prg_return_true: }
              { \prg_return_false: }
          }
      }
      { \prg_return_false: }
  }
```

\DeclareUTFcharacter defines the symbol command # 3 under the code #1, and the Unicode of its corresponding symbol is #2.

```
\RenewDocumentCommand \DeclareUTFcharacter { O { \UTFencname } m m }
  {
    \cs_if_exist_use:cF
      { xunadd_restore_ \tl_to_str:n {#3} : }
      {
        \ xunadd_if_csname:nTF {#3}
          { \ xunadd_declare_character:Nnn #3 }
          { \ xunadd_declare_character:cnn { \tl_to_str:n {#3} }
        {#1} {#2}
      }
  }
```

\ xunadd_restore_ cmd:N restores \hbar and \nobreakspace as originally defined.

```
\cs_new_protected:cpn
  { xunadd_restore_ \tl_to_str:n { \hbar } : }
  { \ xunadd_restore_cmd:N \hbar }
\cs_new_protected:cpn
  { xunadd_restore_ \tl_to_str:n { \nobreakspace } : }
  { \ xunadd_restore_cmd:N \nobreakspace }
\cs_new_protected:Npn \ xunadd_restore_cmd:N #1
  { \ xunadd_restore_cmd:Ne #1 { ? - \token_to_str:N #1 } }
\cs_new_protected:Npn \ xunadd_restore_cmd:Nn #1#2
  {
    \cs_if_free:cF {#2}
      { \ xunadd_restore_cmd:Nc #1 {#2} }
  }
\cs_new_protected:Npn \ xunadd_restore_cmd:NN #1#2
  {
    \cs_gset_eq:NN #1 #2
    \cs_undefine:N #2
  }
```

```
\cs_generate_variant:Nn \ xunadd_restore_cmd:Nn { Ne }
\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.

```
\cs_new_protected:Npn \ xunadd_declare_character:Nnn #1#2#3
  {
    \ xunadd_provide_text_command_default:N #1
    \exp_after:wN \ xunadd_declare_character:NNen
      \tex_Uchar:D \ xunadd_check_slot:n {#3} \exp_stop_f:
      #1 { \token_to_str:N #1 } {#2}
  }
\cs_generate_variant:Nn \ xunadd_declare_character:Nnn { c }
```

\DeclareUTFSymbol \DeclareUTFCommand can only be used to define symbolic commands without parameters.
\DeclareUTFCommand

```
\NewDocumentCommand \DeclareUTFSymbol { m O { \UTFencname } m }
  { \ xunadd_declare_character:Nnn #1 {#2} {#3} }
\NewDocumentCommand \DeclareUTFCommand { m O { \UTFencname } m }
  { \ xunadd_text_command:Nonn #1 { \token_to_str:N #1 } {#2} {#3} }
\cs_new_protected:Npn \ xunadd_text_command:Nnnn #1#2#3#4
  { \ DeclareTextCommand #1 {#3} { \ xunadd_text_command:nn {#2} {#4} } }
\cs_generate_variant:Nn \ xunadd_text_command:Nnnn { No }
\cs_new_protected:Npn \ xunadd_text_command:nn #1#2
  {
    \ xunadd_begin_hook:nn {#1} {#2}
    #2
    \ xunadd_end_hook:nn {#1} {#2}
  }
```

_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

```
\nobreakspace     macro:->\protect \nobreakspace
\copyright        macro:->\protect \copyright
                  \AAmacro:->\r A
\aa               macro:->\r a
\textrhookopeno \long macro:->\textrethookbelow {\textopeno }
\hbar             macro:->{\mathchar '26\mkern -9muh}
\textaolig        macro:->{a\kern -.25em o}
```

The more influential ones are \nobreakspace,\copyright and \hbar.

```
\cs_new_protected:Npn \ xunadd_provide_text_command_default:N #1
  {
    \cs_if_exist:cF { ? \token_to_str:N #1 }
      {
        \cs_if_free:cF { ? - \token_to_str:N #1 }
          {
            \exp_args:NNv \ProvideTextCommandDefault #1
              { ? - \token_to_str:N #1 }
          }
      }
  }
```

_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.

```
\cs_new_protected:Npn \ xunadd_declare_character:NNnn #1#2#3#4
  { \ DeclareTextCommand #2 {#4} { \ xunadd_text_character:nN {#3} {#1} } }
\cs_new_protected:Npn \ xunadd_text_character:nN #1#2
  {
```

```
6656    \xunadd_begin_hook:nn {#1} {#2}
6657    \xunadd_glyph_if_exist:nTF { `#2 }
6658      {#2} { \cs_if_exist_use:cF { ? #1 } {#2} }
```

```
      \ xunadd_end_hook:nn {#1} {#2}
    }
\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.

```
\cs_new:Npn \ xunadd_check_slot:n #1
  {
    \int_eval:n
      {
        \tl_if_head_eq_charcode:nNTF {#1} x
          { " \use_none:n #1 } {#1}
      }
  }
```

\DeclareUTFcomposite sets the symbol command #3 under encoding #1 with its argument #4 of the composite corresponding to the symbol whose Unicode is #2.

```
\RenewDocumentCommand \DeclareUTFcomposite { O { \UTFencname } m m m m }
  {
    \ xunadd_if_csname:nTF {#3}
      { \ xunadd_declare_composite:Nnnn #3 }
      { \ xunadd_declare_composite:cnnn { \tl_to_str:n {#3} }
      {#1} {#4} {#2}
  }
```

__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 \chardefwhich facilitates the determination of the presence of the following characters.

```
\cs_new_protected:Npn \ xunadd_declare_composite:Nnnn #1#2#3#4
  {
    \tex_afterassignment:D \use_none_delimit_by_q_stop:w
    \ xunadd_chardef:cn { \ xunadd_composite_cs:Nnn #1 {#2} {#3} }
      { \ xunadd_check_slot:n {#4} }
    \q_stop
  }
\cs_new_protected:Npn \ xunadd_chardef:Nn #1#2
  { \tex_chardef:D #1 = \tex_numexpr:D #2 \scan_stop: }
\cs_generate_variant:Nn \ xunadd_chardef:Nn { c }
\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 \Declare- TextCompositeCommand, it conflicts with our mechanism.

```
\NewDocumentCommand \DeclareUTFCompositeCommand { m O { \UTFencname } m m }
  { \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 \Declare- TextComposite, it conflicts with our mechanism.

```
\NewDocumentCommand \DeclareUTFCompositeSymbol { m O { \UTFencname } m m }
  {
    \ xunadd_chardef:cn { \ xunadd_composite_cs:Nnn #1 {#2} {#3} }
      { \ xunadd_check_slot:n {#4} }
  }
```

\DeclareUTFComposite sets #1 to a composite symbol command with one argument under code #2.

```
\NewDocumentCommand \DeclareUTFComposite { m O { \UTFencname } }
{ \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.

```
\NewDocumentCommand \DeclareUTFEncodedAccent { m O { \UTFencname } m m }
  { \ xunadd_declare_encoded:NNnnn \ xunadd_combine_accent:nnNnn #1 {#2} {#3} {#4} }
```

\DeclareUTFEncodedAccents #1 is the accent command, #2 is the encoding, and #3 and #4 are both Unicode with combined accent marks. output #1 with the combination of #3 #4.

```
\NewDocumentCommand \DeclareUTFEncodedAccents { m O { \UTFencname } m m }
  { \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.

```
\NewDocumentCommand \DeclareUTFEncodedSymbol { m O { \UTFencname } m m }
  { \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.

```
\NewDocumentCommand \DeclareUTFEncodedCircle { m O { \UTFencname } m m }
  { \xunadd_declare_encoded:NNnnn \xunadd_combine_circle:nnNNn #1 {#2} {#3} {#4} }
```

\DeclareEncodedCompositeCharacter
```
\RenewDocumentCommand \DeclareEncodedCompositeCharacter { m m m m m }
  { \DeclareUTFEncodedSymbol #2 [#1] { "#3 } { "0#4 } }
```

\DeclareEncodedCompositeAccents
```
\RenewDocumentCommand \DeclareEncodedCompositeAccents { m m m m m }
  { \DeclareUTFEncodedAccents #2 [#1] { "#4 } { "#3 } }
```

\DeclareUTFDoubleEncodedAccent
```
\NewDocumentCommand \DeclareUTFDoubleEncodedAccent { m O { \UTFencname } m m }
{ \xunadd_declare_encoded:NNnnn \xunadd_combine_double_accent:nnNn #1 {#2} {#3} {#4} }
```

\DeclareUTFDoubleEncodedSymbol
```
\NewDocumentCommand \DeclareUTFDoubleEncodedSymbol { m O { \UTFencname } m m }
{ \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.

```
\cs_new_protected:Npn \xunadd_declare_composite:Nnn #1#2#3
  { \DeclareTextCommand #1 {#3} { \xunadd_text_composite:nnn {#2} {#3} } }
```

\xunadd_text_composite:nnn
```
\cs_new_protected:Npn \xunadd_text_composite:nnn #1#2#3
  {
    \xunadd_begin_hook:nn {#1} {#3}
    \cs_if_exist:cTF { \xunadd_composite_cs:nnn {#1} {#2} {#3} }
      {
        \xunadd_text_composite:cnn
          { \xunadd_composite_cs:nnn {#1} {#2} {#3} } {#1} {#3}
      }
      { \cs_if_exist_use:cTF { ? #1 } { { {#3} } {#3} }
    \xunadd_end_hook:nn {#1} {#3}
  }
\cs_new_protected:Npn \xunadd_text_composite:Nnn #1#2#3
  {
    \token_if_chardef:NTF #1
      {
        \xunadd_glyph_if_exist:nTF {#1}
          {#1} { \cs_if_exist_use:cTF { ? #2 } { { {#3} } {#3} }
      }
      {#1}
  }
\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.

```
\cs_new_protected:Npn \xunadd_declare_encoded:NNnnn #1#2#3#4#5
  {
    \exp_after:wN \xunadd_declare_encoded:NNNNNee
      \tex_Uchar:D \xunadd_check_slot:n {#4} \exp_after:wN \exp_stop_f:
      \tex_Uchar:D \xunadd_check_slot:n {#5} \exp_stop_f:
      #1 #2 { \token_to_str:N #2 } {#3}
  }
```

```
\cs_new_protected:Npn \ xunadd_declare_encoded:NNNNNnn #1#2#3#4#5#6
  { \DeclareTextCommand #4 {#6} { #3 {#5} {#6} {#1} {#2} } }
\cs_generate_variant:Nn \ xunadd_declare_encoded:NNnnn { c }
\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.

```
\cs_new_protected:Npn \xunadd_text_combine:NnnNNn #1#2#3#4#5#6
  {
    \xunadd_begin_hook:nn {#2} {#6}
    \cs_if_exist:cTF { \xunadd_composite_cs:nnn {#2} {#3} {#6} }
      {
        \xunadd_text_combine:cNnNNn
          { \xunadd_composite_cs:nnn {#2} {#3} {#6} } #1 {#2} {#4} {#5} {#6}
      }
      { #1 {#6} {#2} {#4} {#5} }
    \xunadd_end_hook:nn {#2} {#6}
  }
\cs_new_protected:Npn \xunadd_text_combine:NNnNNNn #1#2#3#4#5#6
  {
    \token_if_chardef:NTF #1
      { \xunadd_glyph_if_exist:nTF {#1} {#1} { #2 {#6} {#3} {#4} {#5} } }
      {#1}
  }
\cs_generate_variant:Nn \xunadd_text_combine:NNnNNn { c }
```

\xunadd_combine_symbol:nnNNn

```
\cs_new_protected:Npn \xunadd_combine_symbol:nnNNn
  { \xunadd_text_combine:NnnNNn \xunadd_add_symbol:nnnNN }
\cs_new_protected:Npn \xunadd_add_symbol:nnNN #1#2#3#4
  {
    \tl_if_blank:nTF {#1}
      {
        \xunadd_glyph_if_exist:nTF { `#4 }
          {#4}
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4} } }
      }
      {
        \xunadd_glyph_if_exist:nTF { `#3 }
          { #1#3 }
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } } }
      }
  }
```

\xunadd_combine_accent:nnNNn \xunadd_add_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 \DeclareTextAccentDefault or use the command set in \DeclareTextCommandDefault. XƎTEX 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; XƎTEX 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 of[18] .

```
\cs_new_protected:Npn \xunadd_combine_accent:nnNNn
  { \xunadd_text_combine:NnnNNn \xunadd_add_accent:nnnNN }
\cs_new_protected:Npn \xunadd_add_accent:nnNN #1#2#3#4
  {
    \tl_if_blank:nTF {#1}
      {
        \xunadd_glyph_if_exist:nTF { `#4 }
          {#4}
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4} } }
      }
      {
        \xunadd_glyph_if_exist:nTF { `#3 }
          { #1#3 }
          {
            \xunadd_glyph_if_exist:nTF { `#4 }
              { \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    }
```

_xunadd_combine_accents:nnNNn
_xunadd_add_accents:nnnNN

```
6801 \cs_new_protected:Npn \_xunadd_combine_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
_xunadd_add_circle:nnNN
_xunadd_add_circle:nN

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 here, otherwise it is still A setting in the LaTeX setting in the

```
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 } { l } { \c_zero_dim } { \c_zero_dim }
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
```

\settextcircledratio Sets the ratio of the width of the text in the circle to the width of the circle, preset to 0.7.

```
6855 \NewDocumentCommand \settextcircledratio { m }
6856    { \fp_set:Nn \l _xunadd_circle_ratio_fp {#1} }
6857 \fp_new:N \l _xunadd_circle_ratio_fp
6858 \settextcircledratio { 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.

```
\cs_new_protected:Npn \xunadd_combine_double_accent:nnNNn
  { \xunadd_text_combine:NnnNNn \xunadd_add_double_accent:nnnNN }
\cs_new_protected:Npn \xunadd_add_double_accent:nnNN #1#2#3#4
  {
    \tl_if_blank:nTF {#1}
      {
        \xunadd_glyph_if_exist:nTF { `#4 }
          {#4}
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4} } }
      }
      {
        \xunadd_glyph_if_exist:nTF { `#3 }
          { \xunadd_add_double_symbol:nN {#1} #3 }
          {
            \xunadd_glyph_if_exist:nTF { `#4 }
              { \add@accent { `#4 } {#1} }
              { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } } }
          }
      }
  }
```

\xunadd_combine_double_symbol:nnNNn make \sliding and other combination accent symbols are placed to the right of the first letter of the argument.

```
\cs_new_protected:Npn \xunadd_combine_double_symbol:nnNNn
  { \xunadd_text_combine:NnnNNn \xunadd_add_double_symbol:nnnNN }
\cs_new_protected:Npn \xunadd_add_double_symbol:nnNN #1#2#3#4
  {
    \tl_if_blank:nTF {#1}
      {
        \xunadd_glyph_if_exist:nTF { `#4 }
          {#4}
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #4} } }
      }
      {
        \xunadd_glyph_if_exist:nTF { `#3 }
          { \xunadd_add_double_symbol:nN {#1} #3 }
          { \cs_if_exist_use:cTF { ? #2 } { { {#1} } { #1#3 } } }
      }
  }
```

\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.

```
\cs_new_protected:Npn \xunadd_add_double_symbol:nN #1#2
  {
    \tl_if_head_is_N_type:nTF {#1}
      {
        \exp_after:wN \exp_after:wN \exp_after:wN
        \xunadd_add_double_symbol_aux:NnN  \ e x p _ a f t e r :wN \exp_after:wN
          \tl_head:w #1 \q_stop \exp_after:wN { \use_none:n #1 } #2
      }
      { #1#2 }
  }
\cs_new_protected:Npn \xunadd_add_double_symbol_aux:NnN #1#2#3
  {
    \bool_lazy_any:nTF
      {
        { \token_if_letter_p:N #1 }
        { \token_if_other_p:N #1 }
        { \token_if_chardef_p:N #1 }
      }
      { #1#3#2 }
      { #1#2#3 }
  }
```

\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.

```
\NewDocumentCommand \AtBeginUTFCommand { s O { } +m }
  {
    \tl_if_blank:nTF {#2}
      {
        \IfBooleanTF {#1}
          { \xunadd_set_begin_hook:n }
          { \xunadd_append_begin_hook:n }
      }
      { \xunadd_set_begin_hook:nn {#2} }
      {#3}
  }
\NewDocumentCommand \AtEndUTFCommand { s O { } +m }
  {
    \tl_if_blank:nTF {#2}
      {
        \IfBooleanTF {#1}
          { \xunadd_set_end_hook:n }
          { \xunadd_append_end_hook:n }
      }
      { \xunadd_set_end_hook:nn {#2} }
      {#3}
  }
```

\xunadd_set_begin_hook:n \xunadd_set_end_hook:n

```
\cs_new_protected:Npn \xunadd_set_begin_hook:n
    { \tl_set:Nn \l xunadd_begin_hook_tl }
\cs_new_protected:Npn \xunadd_append_begin_hook:n
    { \tl_put_right:Nn \l xunadd_begin_hook_tl }
\cs_new_protected:Npn \xunadd_set_end_hook:n
    { \tl_set:Nn \l xunadd_end_hook_tl }
\cs_new_protected:Npn \xunadd_append_end_hook:n
    { \tl_put_right:Nn \l xunadd_end_hook_tl }
\cs_new_protected:Npn \xunadd_set_begin_hook:nn
    { \ xunadd_set_cmd_hook:nnn { begin }
\cs_new_protected:Npn \xunadd_set_end_hook:nn
    { \ xunadd_set_cmd_hook:nnn { end }
\cs_new_protected:Npn \ xunadd_set_cmd_hook:nnn #1#2#3
  {
    \cs_set_protected:cpn
      {
        \tl_if_single:nTF {#2}
          { \use:c { xunadd_#1_csname:n } { \token_to_str:N #2 }
          { \ xunadd_set_cmd_hook_aux:Nnwn #2 \q_stop {#1} }
      } ##1
      {#3}
  }
\cs_new:Npn \ xunadd_set_cmd_hook_aux:Nnwn #1#2 \q_stop #3
  { \use:c { xunadd_#3_csname:n } { \token_to_str:N #1 - \tl_to_str:n {#2} }
\cs_new:Npn \  xunadd_begin_csname:n #1 { xunadd_begin_#1_hook:n }
\cs_new:Npn \ xunadd_end_csname:n #1   { xunadd_end_#1_hook:n }
\tl_new:N \l xunadd_begin_hook_tl
\tl_new:N \l xunadd_end_hook_tl
```

\ xunadd_begin_ hook:nn \ xunadd_end_hook:nn

```
\cs_new_protected:Npn \ xunadd_begin_hook:nn #1#2
{
    \tl_use:N \l xunadd_begin_hook_tl
    \cs_if_exist_use:cF { \ xunadd_begin_csname:n { #1 - \tl_to_str:n {#2} } }
      { \cs_if_exist_use:cF { \ xunadd_begin_csname:n {#1} } { \use_none:n } }
      {#2}
  }
\cs_new_protected:Npn \ xunadd_end_hook:nn #1#2
  {
    \cs_if_exist_use:cF  { \  xunadd_end_csname:n  {  #1  -
\tl_to_str:n {#2} } }
      { \cs_if_exist_use:cF { \ xunadd_end_csname:n
{#1} } { \use_none:n } }
      {#2}
    \tl_use:N \l xunadd_end_hook_tl
```

```
    }
\DeclareUTFTIPACommand \NewDocumentCommand \DeclareUTFTIPACommand { O { \UTFencname } m }
  { \use:e { \ xunadd_text_tipa_command:Nnn \exp_not:N #2 { \token_to_str:N #2 } {#1} }
 \cs_new_protected:Npn \ xunadd_text_tipa_command:Nnn #1#2#3
    {
      \cs_set_eq:cc { UTF/#3#2 } { #3#2 }
      \ DeclareTextCommand #1 {#3} { \ xunadd_text_tipa_command:nnn {#3} {#2} }
    }
 \cs_new_protected:Npn \ xunadd_text_tipa_command:nnn #1#2#3
    {
      \exp_args:Ncc \ xunadd_check_for_tipa:NNNn
        { \use_none:n #2 } { UTF/#1#2 } {#3}
    }
 \cs_new_protected:Npn \ xunadd_check_for_tipa:NNn #1#2#3
    {
      \tl_if_head_eq_meaning:nNTF {#3} \textipa
        {
          \exp_after:wN \tipacatchonechar \exp_after:wN
            { \exp_after:wN #1 \use_none:n #3 }
        }
        { #2 {#3} }
    }
```

\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.

```
 \cs_new_protected:Npn \xunadd_get_slot:nn #1#2
    { \ xunadd_get_slot:wn #2 \q_nil \q_stop {#1} }
 \cs_new_protected:Npn \ xunadd_get_slot:wn #1#2#3 \q_stop #4
    {
      \int_set:Nn \l_xunadd_slot_int { -1 }
      \bool_set_false:N \l_xunadd_rest_bool
      \group_begin: \exp_args:Nccc \group_end:
      { xunadd_get_slot:NNnn }
        { #4 \token_to_str:N #1 }
        { \ xunadd_composite_cs:Nnn #1 {#4} {#2} }
        {#2}
        {#3}
    }
 \int_new:N \l_xunadd_slot_int
 \bool_new:N \l_xunadd_rest_bool
 \cs_new_protected:Npn \ xunadd_get_slot:NNNnn #1#2#3#4
    {
      \cs_if_free:NF #1
        {
          \cs_if_exist:NTF #2
            { \ xunadd_get_composite_slot:Nn #2 {#4} }
            { \ xunadd_get_character_slot:Nn #1 { #3 #4 } }
        }
    }
 \cs_new_protected:Npn \ xunadd_get_composite_slot:Nn #1#2
    {
      \token_if_chardef:NT #1
        {
          \int_set:Nn \l_xunadd_slot_int {#1}
          \quark_if_nil:nF {#2}
            { \bool_set_true:N \l_xunadd_rest_bool }
        }
    }
 \cs_new_protected:Npn \ xunadd_get_character_slot:Nn #1
    {
      \exp_after:wN \ xunadd_get_character_slot_aux:wn #1
        \ xunadd_text_character:nN \q_nil \q_nil \q_stop
    }
 \cs_new_protected:Npn \ xunadd_get_character_slot_aux:wn
    #1 \ xunadd_text_character:nN #2#3#4 \q_stop #5
    {
      \quark_if_nil:nF {#2}
```

```
      {
        \int_set:Nn \l_xunadd_slot_int { `#3 }
        \quark_if_nil:nF {#5}
          { \bool_set_true:N \l_xunadd_rest_bool }
      }
  }
```

The functions used in the \xunadd@microtype@is@charx microtype macro package, we implement the functions by patching \MT@is@charx.

```
\cs_new_protected_nopar:Npn \xunadd@microtype@is@charx #1 \relax
  {
    \use:e
      { \xunadd_get_slot:nn { \MT@encoding } { \tex_the:D \MT@toks } }
    \int_compare:nNnTF \l_xunadd_slot_int < \c_zero_int
      { \xunadd@original@is@charx #1 \relax }
      {
        \cs_set_nopar:Npx \MT@char@ { \int_use:N \l_xunadd_slot_int }
        \bool_if:NT \l_xunadd_rest_bool { \MT@norestfalse }
      }
  }
\cs_new_protected_nopar:Npn \xunadd@microtype@hook
  {
    \cs_if_free:NF \MT@is@charx
      {
        \cs_new_eq:NN \xunadd@original@is@charx \MT@is@charx
        \cs_set_eq:NN \MT@is@charx \xunadd@microtype@is@charx
        \cs_set_eq:NN \MT@warn@unknown@once \use_none:n
      }
  }
\@ifpackageloaded { microtype }
  { \use:n } { \AtBeginDocument }
  { \xunadd@microtype@hook }
```

```
⟨/xunicode⟩
⟨*xunextra⟩
```

We add the definition of HYPHENATION POINT and TWO-EM DASH, which are classified as CJK punctuation by default.

```
\DeclareUTFSymbol\texthyphenationpoint{"2027}
\DeclareUTFSymbol\texttwoemdash{"2E3A}
```

The following content is taken from xunicode and modified as appropriate.

```
\DeclareUTFComposite\textsuperscript
\DeclareUTFComposite\textsubscript
\DeclareUTFEncodedAccent\textsbleftarrow{"20EE}{"20FF}
\DeclareUTFEncodedAccent\`{"0300}{"02CB}
\DeclareUTFEncodedAccent\capitalgrave{"0300}{"02CB}
\DeclareUTFEncodedAccent\'{"0301}{"02CA}
\DeclareUTFEncodedAccent\capitalacute{"0301}{"02CA}
\DeclareUTFEncodedAccent\^{"0302}{"02C6}
\DeclareUTFEncodedAccent\capitalcircumflex{"0302}{"02C6}
\DeclareUTFEncodedAccent\~{"0303}{"02DC}
\DeclareUTFEncodedAccent\capitaltilde{"0303}{"02DC}
\DeclareUTFEncodedAccent\={"0304}{"02C9}
\DeclareUTFEncodedAccent\capitalmacron{"0304}{"02C9}
\DeclareUTFEncodedAccent\textoverline{"0305}{"203E}
\DeclareUTFEncodedAccent\u{"0306}{"02D8}
\DeclareUTFEncodedAccent\capitalbreve{"0306}{"02D8}
\DeclareUTFEncodedAccent\. {"0307}{"02D9}
\DeclareUTFEncodedAccent\capitaldotaccent{"0307}{"02D9}
\DeclareUTFEncodedAccent\"{"0308}{"00A8}
\DeclareUTFEncodedAccent\capitaldieresis{"0308}{"00A8}
\DeclareUTFEncodedAccent\m{"0309}{"0309}
\DeclareUTFEncodedAccent\texthookabove{"0309}{"0309}
\DeclareUTFEncodedAccent\r{"030A}{"02DA}
```

```
\DeclareUTFEncodedAccent\capitalring{"030A}{"02DA}
\DeclareUTFEncodedAccent\H{"030B}{"02DD}
\DeclareUTFEncodedAccent\capitalhungarumlaut{"030B}{"02DD}
\DeclareUTFEncodedAccent\v{"030C}{"02C7}
\DeclareUTFEncodedAccent\capitalcaron{"030C}{"02C7}
\DeclareUTFEncodedAccent\textvbaraccent{"030D}{"02C8}
\DeclareUTFEncodedAccent\textdoublevbaraccent{"030E}{"0022}
\DeclareUTFEncodedAccent\U{"030E}{"0022}
\DeclareUTFEncodedAccent\textdoublegrave{"030F}{"02F5}
\DeclareUTFEncodedAccent\G{"030F}{"02F5}
\DeclareUTFEncodedAccent\textdotbreve{"0310}{"0310}
\DeclareUTFEncodedAccent\textroundcap{"0311}{"0311}
\DeclareUTFEncodedAccent\newtie{"0311}{"0311}
\DeclareUTFEncodedAccent\capitalnewtie{"0311}{"0311}
\DeclareUTFEncodedAccent\textturncommaabove{"0312}{"02BB}
\DeclareUTFEncodedAccent\textcommaabove{"0313}{"02BC}
\DeclareUTFEncodedAccent\textrevcommaabove{"0314}{"02BD}
\DeclareUTFEncodedAccent\overbridge{"0346}{"0346}
\DeclareUTFEncodedAccent\crtilde{"034A}{"034A}
\DeclareUTFEncodedAccent\dottedtilde{"034B}{"034B}
\DeclareUTFEncodedAccent\doubletilde{"034C}{"034C}
\DeclareUTFEncodedAccent\textrightarrowhead{"0350}{"02C3}
\DeclareUTFEncodedAccent\textlefthalfring{"0351}{"02D3}
\DeclareUTFEncodedAccent\textrighthalfring{"0357}{"02D2}
\DeclareUTFDoubleEncodedSymbol\textdoublebrevebelow{"035C}{"035C}
\DeclareUTFDoubleEncodedAccent\textdoublebreve{"035D}{"035D}
\DeclareUTFDoubleEncodedAccent\textdoublemacron{"035E}{"035E}
\DeclareUTFDoubleEncodedSymbol\textdoublemacronbelow{"035F}{"035F}
\DeclareUTFDoubleEncodedAccent\textdoubletilde{"0360}{"0360}
\DeclareUTFDoubleEncodedAccent\t{"0361}{"0361}
\DeclareUTFDoubleEncodedAccent\capitaltie{"0361}{"0361}
\DeclareUTFDoubleEncodedAccent\texttoptiebar{"0361}{"0361}
\DeclareUTFDoubleEncodedSymbol\sliding{"0362}{"0362}
\DeclareUTFTIPACommand\t
\DeclareUTFTIPACommand\capitaltie
\DeclareUTFTIPACommand\texttoptiebar
\DeclareUTFTIPACommand\sliding
\DeclareUTFEncodedAccent\texthighrise{"1DC4}{"1DC4}
\DeclareUTFEncodedAccent\textlowrise{"1DC5}{"1DC5}
\DeclareUTFEncodedAccent\textrisefall{"1DC8}{"1DC8}
\DeclareUTFEncodedAccent\textfallrise{"1DC9}{"1DC9}
\DeclareUTFEncodedAccent\textaolig{"1DD5}{"1DD5}
\DeclareUTFCompositeSymbol\textundertie{H}{"1E2A}
\DeclareUTFCompositeSymbol\textundertie{h}{"1E2B}
\DeclareUTFEncodedAccents\textcircumgrave{"0302}{"0301}
\DeclareUTFSymbol\textFinv{"2132}
\DeclareUTFSymbol\textaleph{"2135}
\DeclareUTFSymbol\textbeth{"2136}
\DeclareUTFSymbol\textgimel{"2137}
\DeclareUTFSymbol\textdaleth{"2138}
\DeclareUTFSymbol\textGame{"2141}
\DeclareUTFCompositeCommand\tonebar{25}{\tonebar{2}\tonebar{5}}
\DeclareUTFCompositeCommand\tonebar{52}{\tonebar{5}\tonebar{2}}
\DeclareUTFSymbol\textbigcircle{"25EF}
\DeclareUTFEncodedCircle\textcircled{"20DD}{"25EF}
\DeclareUTFCompositeSymbol\textcircled{0}{"24EA}
\DeclareUTFCompositeSymbol\textcircled{1}{"2460}
\DeclareUTFCompositeSymbol\textcircled{2}{"2461}
\DeclareUTFCompositeSymbol\textcircled{3}{"2462}
\DeclareUTFCompositeSymbol\textcircled{4}{"2463}
\DeclareUTFCompositeSymbol\textcircled{5}{"2464}
\DeclareUTFCompositeSymbol\textcircled{6}{"2465}
\DeclareUTFCompositeSymbol\textcircled{7}{"2466}
\DeclareUTFCompositeSymbol\textcircled{8}{"2467}
\DeclareUTFCompositeSymbol\textcircled{9}{"2468}
\DeclareUTFCompositeSymbol\textcircled{10}{"2469}
\DeclareUTFCompositeSymbol\textcircled{11}{"246A}
```

```
\DeclareUTFCompositeSymbol\textcircled{12}{"246B}
\DeclareUTFCompositeSymbol\textcircled{13}{"246C}
\DeclareUTFCompositeSymbol\textcircled{14}{"246D}
\DeclareUTFCompositeSymbol\textcircled{15}{"246E}
\DeclareUTFCompositeSymbol\textcircled{16}{"246F}
\DeclareUTFCompositeSymbol\textcircled{17}{"2470}
\DeclareUTFCompositeSymbol\textcircled{18}{"2471}
\DeclareUTFCompositeSymbol\textcircled{19}{"2472}
\DeclareUTFCompositeSymbol\textcircled{20}{"2473}
\DeclareUTFCompositeSymbol\textcircled{21}{"3251}
\DeclareUTFCompositeSymbol\textcircled{22}{"3252}
\DeclareUTFCompositeSymbol\textcircled{23}{"3253}
\DeclareUTFCompositeSymbol\textcircled{24}{"3254}
\DeclareUTFCompositeSymbol\textcircled{25}{"3255}
\DeclareUTFCompositeSymbol\textcircled{26}{"3256}
\DeclareUTFCompositeSymbol\textcircled{27}{"3257}
\DeclareUTFCompositeSymbol\textcircled{28}{"3258}
\DeclareUTFCompositeSymbol\textcircled{29}{"3259}
\DeclareUTFCompositeSymbol\textcircled{30}{"325A}
\DeclareUTFCompositeSymbol\textcircled{31}{"325B}
\DeclareUTFCompositeSymbol\textcircled{32}{"325C}
\DeclareUTFCompositeSymbol\textcircled{33}{"325D}
\DeclareUTFCompositeSymbol\textcircled{34}{"325E}
\DeclareUTFCompositeSymbol\textcircled{35}{"325F}
\DeclareUTFCompositeSymbol\textcircled{36}{"32B1}
\DeclareUTFCompositeSymbol\textcircled{37}{"32B2}
\DeclareUTFCompositeSymbol\textcircled{38}{"32B3}
\DeclareUTFCompositeSymbol\textcircled{39}{"32B4}
\DeclareUTFCompositeSymbol\textcircled{40}{"32B5}
\DeclareUTFCompositeSymbol\textcircled{41}{"32B6}
\DeclareUTFCompositeSymbol\textcircled{42}{"32B7}
\DeclareUTFCompositeSymbol\textcircled{43}{"32B8}
\DeclareUTFCompositeSymbol\textcircled{44}{"32B9}
\DeclareUTFCompositeSymbol\textcircled{45}{"32BA}
\DeclareUTFCompositeSymbol\textcircled{46}{"32BB}
\DeclareUTFCompositeSymbol\textcircled{47}{"32BC}
\DeclareUTFCompositeSymbol\textcircled{48}{"32BD}
\DeclareUTFCompositeSymbol\textcircled{49}{"32BE}
\DeclareUTFCompositeSymbol\textcircled{50}{"32BF}
\DeclareUTFCompositeSymbol\textcircled{A}{"24B6}
\DeclareUTFCompositeSymbol\textcircled{B}{"24B7}
\DeclareUTFCompositeSymbol\textcircled{C}{"24B8}
\DeclareUTFCompositeSymbol\textcircled{D}{"24B9}
\DeclareUTFCompositeSymbol\textcircled{E}{"24BA}
\DeclareUTFCompositeSymbol\textcircled{F}{"24BB}
\DeclareUTFCompositeSymbol\textcircled{G}{"24BC}
\DeclareUTFCompositeSymbol\textcircled{H}{"24BD}
\DeclareUTFCompositeSymbol\textcircled{I}{"24BE}
\DeclareUTFCompositeSymbol\textcircled{J}{"24BF}
\DeclareUTFCompositeSymbol\textcircled{K}{"24C0}
\DeclareUTFCompositeSymbol\textcircled{L}{"24C1}
\DeclareUTFCompositeSymbol\textcircled{M}{"24C2}
\DeclareUTFCompositeSymbol\textcircled{N}{"24C3}
\DeclareUTFCompositeSymbol\textcircled{O}{"24C4}
\DeclareUTFCompositeSymbol\textcircled{P}{"24C5}
\DeclareUTFCompositeSymbol\textcircled{Q}{"24C6}
\DeclareUTFCompositeSymbol\textcircled{R}{"24C7}
\DeclareUTFCompositeSymbol\textcircled{S}{"24C8}
\DeclareUTFCompositeSymbol\textcircled{T}{"24C9}
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The following definitions are taken from hyperref's puenc.def.

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⟨/xunextra⟩

⟨@@=xeCJK⟩

5.22 xeCJK.cfg

⟨*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.

⟨/config⟩

Version History

v3.2.0 (2013/04/14 - 2013/05/22)

v3.2.1 (2013/05/29)

v3.2.2 (2013/05/30 - 2013/06/04)

v3.2.3 (2013/06/04 - 2013/06/11)

v3.2.4 (2013/06/23 - 2013/07/06)

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