

# The LXGW Font Family\* | 落霞与孤鹜齐飞 秋水共长天一色

Designer: LXGW (霞鹜) / TrionesType (璇璣造字)<sup>†</sup> Maintainer: Mingyu Xia<sup>‡</sup>

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This package packs a selection of open-source CJK fonts from 霞鹜新繖宋, 霞鹜新晰黑, 霞鹜文楷, 霞鹜臻楷, which are released into public domain by LXGW and 朱雀仿宋 released into public domain by TrionesType since 2021. They are licensed under the SIL Open Font License (OFL).

## Abstract

The LXGW Font Family provides an open-source CJK font family with a comprehensive character set for Chinese (Simplified/Traditional), Cantonese, and Japanese. A fontset configuration of this font family for the ctex-kit is also provided in this package.

## 1 Usage

Users are allowed to use the friendly interface: the fontset key in the ctex classes or package

```
\documentclass[fontset = lxgw]{ctex<art|book|rep|beamer>}  
\usepackage[fontset = lxgw]{ctex}
```

with Xe<sub>La</sub>TeX, Lua<sub>La</sub>TeX, E<sub>La</sub>TeX + DVIPDFMx, up<sub>La</sub>TeX + DVIPDFMx, and Ap<sub>La</sub>TeX (aka p<sub>La</sub>TeX-ng) supported. pdf<sub>La</sub>TeX is not supported temporarily since the long mapping time of zhmap. Additionally, the following four commands are provided for convenience.

\songti	宋体 (CJKmainfont): LXGWNeoZhiSong.ttf, LXGWNeoZhiSongScreen.ttf
\heiti	黑体 (CJKsansfont): LXGWNeoXiHei.ttf, LXGWNeoXiHeiScreen.ttf
\fangsong	仿宋 (CJKmonofont): LXGWZhuqueFangsong-Regular.ttf (AutoFakeBold enabled)
\kaishu	楷书 (it. of CJKmainfont): LXGWWenKaiLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

The .ttf files are sourced from the following links

- <https://github.com/lxgw/LxgwNeoZhiSong/releases/latest/download/LXGWNeoZhiSong.ttf>
- <https://github.com/lxgw/LxgwNeoXiZhi-Screen/releases/latest/download/LXGWNeoZhiSongScreen.ttf>
- <https://github.com/lxgw/LxgwNeoXiHei/releases/latest/download/LXGWNeoXiHei.ttf>
- <https://github.com/lxgw/LxgwNeoXiZhi-Screen/releases/latest/download/LXGWNeoXiHeiScreen.ttf>
- <https://github.com/TrionesType/zhuque/releases/download/v0.212/ZhuqueFangsong-v0.212.zip>
- <https://github.com/lxgw/LxgwWenKai-Lite/releases/latest/download/LXGWWenKaiLite-Regular.ttf>
- <https://github.com/lxgw/LxgwZhenKai/releases/latest/download/LXGWZhenKaiGB-Regular.ttf>

The implementation of this user-friendly interface is included in A.1, A.2, and A.3.

\*<https://github.com/myhsia/LXGW-CTAN>

<sup>†</sup><https://github.com/lxgw>, <https://github.com/TrionesType/zhuque>

<sup>‡</sup>[xiamingyu@westlake.edu.cn](mailto:xiamingyu@westlake.edu.cn)

## 2 Font Demos

The following lists the Chinese/English name, filename, and demos of the fonts: Cantonese, Japanese, Chinese (Simplified/Traditional) versions of “**I Can Eat Glass**”, missing character markers are provided with punctuation compression disabled and fulfilling line.

霞鶯新緻宋 (LXGW Neo ZhiSong) LXGWNeoZhiSong.ttf, LXGWNeoZhiSongScreen.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。☒☒☒

霞鶯新晰黑 (LXGW Neo XiHei) LXGWNeoXiHei.ttf, LXGWNeoXiHeiScreen.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。☒☒☒

朱雀仿宋 (ZHUQUE FANGSONG) LXGWZhuqueFangsong-Regular.ttf

我可以食玻璃，佢傷唔到我■。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。■■■

霞鶯 文楷/臻楷 (LXGW WenKai/ZhenKai) LXGWWenKaiLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

我可以食玻璃，佢傷唔到我㗎。私はガラスを食べられます。それは私を傷つけません。  
我能吞下玻璃而不伤身体。我能吞下玻璃而不伤身体。我能吞下玻璃而不傷身體。②②②

## A The Source Code

### A.1 The `ctex-fontset-lxgw.def` file

Start the optionlist fontset for l3docstrip.

```
1 <*fontset>
```

Declare the ctex-kit font configuration file with date, version, and description.

```
2 \ProvidesExplFile {ctex-fontset-lxgw.def} {2026-01-15} {v1.521L}
3 {lxgw fontset configuration for ctex-kit}
```

Load CJK font family, interface, accepts the following 4 branches, provided by ctex-kit.

```
4 \ctex_fontset_case:nnnn
```

pdf<sub>T</sub><sub>E</sub>X (generate PDF) This branch is no longer supported here, and a `fontset-unavailable` error will raise.

```
5 { \ctex_fontset_error:n { lxgw } }
```

**T<sub>E</sub>Xhackers note:** For some fontset that supports this branch, line 4 – 5 should be replaced as a line

```
\ctex_fontset_case:nnn
```

pdf<sub>T</sub><sub>E</sub>X (generate DVI) For those use L<sub>A</sub>T<sub>E</sub>X + DVIPDFMx.

```
6 {
```

Load the .spa file for the CJKpunct package.

```
7 \ctex_file_input:n { ctex-spa-lxgw.spa }
```

Case choice controlled by the zhmap key of ctex-kit.

```
8 \ctex_zhmap_case:nnn
```

#1: Content of this argument will be outputted to the input stream when `zhmap = zhmcJK`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_i:nnn
```

The LXGW font family uses the UniGB-UTF16-H cmap (Character To Glyph Index Mapping Table).

```
9 {
10   \setCJKmainfont { LXGWNeoZhiSong.ttf }
11   [
12     cmap = UniGB-UTF16-H, AutoFakeBold,
13     ItalicFont = LXGWWenKaiLite-Regular.ttf,
14     BoldItalicFont = LXGWZhenKaiGB-Regular.ttf
15   ]
16   \setCJKsansfont { LXGWNeoXiHei.ttf }
17   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
18   \setCJKmonofont { LXGWZhuqueFangsong-Regular.ttf }
19   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
20   \setCJKfamilyfont { zhsong } { LXGWNeoZhiSong.ttf }
21   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
22   \setCJKfamilyfont { zhhei } { LXGWNeoXiHei.ttf }
23   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
24   \setCJKfamilyfont { zhfs } { LXGWZhuqueFangsong-Regular.ttf }
25   [ cmap = UniGB-UTF16-H, AutoFakeBold ]
26   \setCJKfamilyfont { zhkai } { LXGWWenKaiLite-Regular.ttf }
27   [ cmap = UniGB-UTF16-H, BoldFont = LXGWZhenKaiGB-Regular.ttf ]
```

Configure the usages of the edge information of the defined CJK families.

```

28         \ctex_punct_set:n { lxxg }
29         \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
30         \ctex_punct_map_family:nn { \CJKsfdefault } { zhhei }
31         \ctex_punct_map_family:nn { \CJKttdefault } { zhfs }
32         \ctex_punct_map_bfseries:nn { \CJKrmdefault, zhsong } { zhsongb }
33         \ctex_punct_map_bfseries:nn { \CJKsfdefault, zhhei } { zhheib }
34         \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
35     }

```

#2: Content of this argument will be outputted to the input stream when `zhmap = true`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_ii:nnn
```

Load the mapping file `ctex-zhmap-lxxg.tex` for `zhmatrices` and set `\CJKrmdefault`, `\CJKsfdefault`, `\CJKttdefault`, respectively.

```

36     {
37         \ctex_load_zhmap:nnnn { rm } { zhhei } { zhfs } { lxxg }

```

Configure the usages of the edge information of `\CJKrmdefault`.

```

38         \ctex_punct_set:n { lxxg }
39         \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
40         \ctex_punct_map_bfseries:nn { \CJKrmdefault } { zhhei }
41         \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
42     }

```

#3: Content of this argument will be outputted to the input stream when `zhmap = false`

```
\cs_gset_eq:NN \ctex_zhmap_case:nnn \use_iii:nnn
```

Here will raise a `fontset-unavailable` error.

```

43     { \ctex_fontset_error:n { lxxg } }
44 }

```

up<sub>TeX</sub>, Ap<sub>TeX</sub> (aka p<sub>TeX</sub>-ng) For those use up<sub>TeX</sub> + DVIPDFMx. Configure the basic font mapping for up<sub>TeX</sub>. Due to the definition in `zhmetrics-uptex`, configure

1. upshape of serif font.
2. bfseries of serif font.
3. itshape of serif font.
4. upshape of sans font.
5. bfseries of sans font.
6. upshape of mono font.

```

45 {
46     \ctex_set_upfonts:nnnnnn
47     { LXGWNaoZhiSong.ttf }
48     { LXGWNaoZhiSongScreen.ttf }
49     { LXGWenKaiLite-Regular.ttf }
50     { LXGWNaoXiHei.ttf }
51     { LXGWNaoXiHeiScreen.ttf }
52     { LXGWZhuqueFangsong-Regular.ttf }

```

Config the NFSS font families `zhsong`, `zhhei`, `zhfs`, and `zhkai` to the JFM name in normal type and bold type. Leave empty for those font families with no bold version.

```

53     \ctex_set_upfamily:nnn { zhsong } { upzhserif } { upzhserifb }
54     \ctex_set_upfamily:nnn { zhhei } { upzhsans } { upzhsans }
55     \ctex_set_upfamily:nnn { zhfs } { upzhmono } { }
56     \ctex_set_upfamily:nnn { zhkai } { upzhserifit } { }
57 }

```

X<sub>3</sub>TeX, LuaTeX For those use X<sub>3</sub>TeX or LuaTeX.

```

58 {
59   \setCJKmainfont { LXGWNeoZhiSong }
60   [
61     Extension      = .ttf, AutoFakeBold,
62     ItalicFont      = LXGWWenKaiLite-Regular,
63     BoldItalicFont = LXGWZhenKaiGB-Regular.ttf
64   ]
65   \setCJKsansfont { LXGWNeoXiHei }
66   [ Extension = .ttf, AutoFakeBold ]
67   \setCJKmonofont { LXGWZhuqueFangsong-Regular }
68   [ Extension = .ttf, AutoFakeBold ]
69   \setCJKfamilyfont { zhsong } { LXGWNeoZhiSong }
70   [ Extension = .ttf, AutoFakeBold ]
71   \setCJKfamilyfont { zhhei } { LXGWNeoXiHei }
72   [ Extension = .ttf, AutoFakeBold ]
73   \setCJKfamilyfont { zhfs } { LXGWZhuqueFangsong-Regular }
74   [ Extension = .ttf, AutoFakeBold ]
75   \setCJKfamilyfont { zhkai } { LXGWWenKaiLite-Regular }
76   [ Extension = .ttf, BoldFont = LXGWZhenKaiGB-Regular ]
77 }

```

```

\songti Shortcuts that same as those in the ctex-kit.
\heiti  78 \NewDocumentCommand \songti { } { \CJKfamily { zhsong } }
\fangsong 79 \NewDocumentCommand \heiti { } { \CJKfamily { zhhei } }
\kaishu  80 \NewDocumentCommand \fangsong { } { \CJKfamily { zhfs } }
          81 \NewDocumentCommand \kaishu { } { \CJKfamily { zhkai } }

```

(End of definition for `\songti` and others. These functions are documented on page 1.)

End the optionlist fontset for l3docstrip.

```

82 </fontset>

```

## A.2 The `ctex-spa-make.tex` and the `ctexpunct-lxgw.tex` file

The `.spa` file of the corresponding font will be used for the CJKpunct package to achieve the punctuation compression, which can ensure the best typeset effect (under the pdfTeX engine). Run the following script, `ctex-spa-make.tex`, by executing

```
xetex ctex-spa-make
```

in the terminal. Then, one can obtain the `ctexpunct-lxgw.tex` file.

**Implementation of the script** Start the optionlist makespa for l3docstrip.

```

83 <*makespa>

```

Assign the module name of the variables and control sequences, which will be automatically replaced by l3docstrip.

```

84 <@@=ctex>

```

Loading the macro file `ctex-spa-macro.tex` provided by ctex-kit.

```

85 \input ctex-spa-macro %

```

However, the macro file needs to be hacked due to the interface change of Xe<sub>La</sub>TeX.

```

86 \ExplSyntaxOn
87 \cs_set_protected:Npn \__ctex_write_family:nn #1#2
88 {
89   \group_begin:
90   \tex_font:D \l__ctex_punct_font = "[#2]" ~ at ~ 100 pt \scan_stop:
91   \l__ctex_punct_font
92   \clist_clear:N \l__ctex_punct_bounds_clist
93   \seq_map_inline:Nn \c__ctex_punct_seq
94   {
95     \exp_args:No \__ctex_save_bounds:n
96     { \int_use:N \tex_XeTeXcharglyph:D ##1 }
97   }
98   \iow_now:Nx \g__ctex_spa_iow
99   {
100     \token_to_str:N \ctexspadef {#1}
101     { \l__ctex_punct_bounds_clist , , , }
102   }
103   \group_end:
104 }
105 \ExplSyntaxOff

```

List all the CJK families with the corresponding font files in terms of “case-pairs”.

```

106 \MAKESPA {ctexpunct-lxgw.tex}
107 {
108   {lxgwzhsong}      {LXGWNeoZhiSong} ,
109   {lxgwzhsongb}     {LXGWNeoZhiSongScreen} ,
110   {lxgwzhhei}       {LXGWNeoXiHei} ,
111   {lxgwzhheib}      {LXGWNeoXiHeiScreen} ,
112   {lxgwzhfs}        {LXGWZhuqueFangsong-Regular} ,
113   {lxgwzhkai}       {LXGWWenKaiLite-Regular} ,
114   {lxgwzhkaib}      {LXGWZhenKaiGB-Regular} ,
115 }

```

End of the script.

```

116 \primitive\end

```

Restore the module name.

```

117 <@@=

```

End the optionlist zhmap for l3docstrip.

```

118 </makespa>

```

### A.3 The ctex-zhmap-lxgw.tex file

Start the optionlist zhmap for l3docstrip.

```

119 <*zhmap>

```

Forked from the zhmap optionlist of ctex.dtx<sup>1</sup>.

```

120 \begingroup\catcode61\catcode48\catcode32=10\relax%
121 \catcode 35=6 % #
122 \catcode 45=12 % -
123 \catcode123=1 % {

```

<sup>1</sup><https://github.com/CTeX-org/ctex-kit/blob/master/ctex/ctex.dtx>

```

124 \catcode125=2 % }
125 \toks0{\endlinechar=\the\endlinechar\relax}%
126 \toks2{\endlinechar=-1}%
127 \def\x#1 #2 {%
128   \toks0\expandafter{\the\toks0 \catcode#1=\the\catcode#1\relax}%
129   \toks2\expandafter{\the\toks2 \catcode#1=#2 }}%
130 \x 13 5 % carriage return
131 \x 32 10 % space
132 \x 35 6 % #
133 \x 40 12 % (
134 \x 41 12 % )
135 \x 45 12 % -
136 \x 46 12 % .
137 \x 47 12 % /
138 \x 58 12 % :
139 \x 60 12 % <
140 \x 61 12 % =
141 \x 64 11 % @
142 \x 91 12 % [
143 \x 93 12 % ]
144 \x 123 1 % {
145 \x 125 2 % }
146 \edef\x#1{\endgroup%
147   \edef\noexpand#1{%
148     \the\toks0 %
149     \let\noexpand\noexpand\noexpand#1%
150     \noexpand\noexpand\noexpand\noexpand\undefined%
151     \noexpand\noexpand\noexpand\endinput}%
152   \the\toks2}%
153 \expandafter\x\csname ctex@zhmap@endinput\endcsname
154 \begingroup\expandafter\endgroup
155 \expandafter\let\csname ifzhmappdf\expandafter\endcsname\csname
156   \expandafter\ifx\csname ifctexpdf\endcsname\relax
157     \expandafter\ifx\csname pdfoutput\endcsname\relax
158       iffalse\else\ifnum\pdfoutput < 1 iffalse\else iftrue\fi\fi
159     \else ifctexpdf\fi
160   \endcsname
161 \begingroup
162 \expandafter\ifx\csname ProvidesFile\endcsname\relax
163   \long\def\x#1\ProvidesFile#2[#3]{%
164     #1%
165     \immediate\write-1{File: #2 #3}%
166     \expandafter\xdef\csname ver@#2\endcsname{#3}}
167   \expandafter\x%
168 \fi
169 \endgroup

```

Provides the identification information of the font map loader.

```

170 \ProvidesFile{ctex-zhmap-lxgw.tex}%
171 [2026-01-15 v1.521L lxgw font map loader for DVIPDFMx (CTEX)]

```

Font map loader for pdf<sub>T</sub><sub>E</sub>X and DVIPDFMx.

```

172 \ifzhmappdf

```

Since pdf<sub>T</sub><sub>E</sub>X maps too slowly, this mode is obsolete.

```

173 \iffalse
174 \pdfmapline{=gbk@UGBK@ <LXGWNeoZhiSong.ttf}
175 \pdfmapline{=gbksong@UGBK@ <LXGWNeoZhiSong.ttf}
176 \pdfmapline{=gbkkai@UGBK@ <LXGWWenKaiLite-Regular.ttf}
177 \pdfmapline{=gbkhei@UGBK@ <LXGWNeoXiHei.ttf}
178 \pdfmapline{=gbkfs@UGBK@ <LXGWZhuqueFangsong-Regular.ttf}
179 \pdfmapline{=cyberb@Unicode@ <LXGWNeoZhiSong.ttf}
180 \pdfmapline{=unisong@Unicode@ <LXGWNeoZhiSong.ttf}
181 \pdfmapline{=unikai@Unicode@ <LXGWWenKaiLite-Regular.ttf}
182 \pdfmapline{=unihei@Unicode@ <LXGWNeoXiHei.ttf}
183 \pdfmapline{=unifs@Unicode@ <LXGWZhuqueFangsong-Regular.ttf}
184 \pdfmapline{=gbksongsl@UGBK@ <LXGWNeoZhiSong.ttf}
185 \pdfmapline{=gbkkaisl@UGBK@ <LXGWWenKaiLite-Regular.ttf}
186 \pdfmapline{=gbkheisl@UGBK@ <LXGWNeoXiHei.ttf}
187 \pdfmapline{=gbkfssl@UGBK@ <LXGWZhuqueFangsong-Regular.ttf}
188 \pdfmapline{=unisongsl@Unicode@ <LXGWNeoZhiSong.ttf}
189 \pdfmapline{=unikaisl@Unicode@ <LXGWWenKaiLite-Regular.ttf}
190 \pdfmapline{=uniheisl@Unicode@ <LXGWNeoXiHei.ttf}
191 \pdfmapline{=unifssl@Unicode@ <LXGWZhuqueFangsong-Regular.ttf}
192 \fi

```

Configuration for pdf<sub>T</sub><sub>E</sub>X (generate DVI).

```

193 \else

```

Configure the upright shape of `\songti`, `\kaishu`, `\heiti`, and `\fangsong` mapping for GBK encoding and UTF8 encoding.

```

194 \special{pdf:mapline gbk@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
195 \special{pdf:mapline gbksong@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
196 \special{pdf:mapline gbkkai@UGBK@ UniGB-UTF16-H LXGWWenKaiLite-Regular.ttf}
197 \special{pdf:mapline gbkhei@UGBK@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
198 \special{pdf:mapline gbkfs@UGBK@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf}
199 \special{pdf:mapline cyberb@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
200 \special{pdf:mapline unisong@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
201 \special{pdf:mapline unikai@Unicode@ UniGB-UTF16-H LXGWWenKaiLite-Regular.ttf}
202 \special{pdf:mapline unihei@Unicode@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
203 \special{pdf:mapline unifs@Unicode@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf}

```

Similar for the (fake) slant shape, set the *Afine Transformation coefficient* to 0.167, which is the same as the default value of `AutoFakeSlant` in the `xeCJK` package.

```

204 \special{pdf:mapline gbksongsl@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
205 \special{pdf:mapline gbkkaisl@UGBK@ UniGB-UTF16-H LXGWWenKaiLite-Regular.ttf -s .167}
206 \special{pdf:mapline gbkheisl@UGBK@ UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
207 \special{pdf:mapline gbkfssl@UGBK@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
208 \special{pdf:mapline unisongsl@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
209 \special{pdf:mapline unikaisl@Unicode@ UniGB-UTF16-H LXGWWenKaiLite-Regular.ttf -s .167}
210 \special{pdf:mapline uniheisl@Unicode@ UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
211 \special{pdf:mapline unifssl@Unicode@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
212 \fi

```

End the optionlist `zhmap` for `l3docstrip`.

```

213 \</zhmap>

```



# Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

Symbols	
X <sub>Y</sub> TeX, LuaTeX (option) . . . . .	5
pdf <sub>Y</sub> TeX (generate DVI) (option) . . . . .	3
pdf <sub>Y</sub> TeX (generate PDF) (option) . . . . .	3
upTeX, ApTeX (aka pTeX-ng) (option) . . . . .	4
B	
\begingroup . . . . .	120, 154, 161
C	
\catcode . . . . .	120, 121, 122, 123, 124, 128, 129
\CJKfamily . . . . .	78, 79, 80, 81
\CJKrmdefault . . . . .	4, 29, 32, 34, 39, 40, 41
\CJKsfdefault . . . . .	4, 30, 33
\CJKttdefault . . . . .	4, 31
clist commands:	
\clist_clear:N . . . . .	92
cs commands:	
\cs_gset_eq:NN . . . . .	3, 4
\cs_set_protected:Npn . . . . .	87
\csname . . . . .	153, 155, 156, 157, 162, 166
ctex commands:	
\ctex_file_input:n . . . . .	7
\ctex_fontset_case:nnnn . . . . .	4
\ctex_fontset_error:n . . . . .	5, 43
\ctex_load_zhmap:nnnn . . . . .	37
\ctex_punct_map_bfseries:nn . . . . .	32, 33, 40
\ctex_punct_map_family:nn . . . . .	29, 30, 31, 39
\ctex_punct_map_itshape:nn . . . . .	34, 41
\ctex_punct_set:n . . . . .	28, 38
\ctex_set_upfamily:nnn . . . . .	53, 54, 55, 56
\ctex_set_upfonts:nnnnnn . . . . .	46
\ctex_zhmap_case:nnn . . . . .	3, 4, 8
ctex internal commands:	
\l__ctex_punct_bounds_clist . . . . .	92, 101
\l__ctex_punct_font . . . . .	90, 91
\c__ctex_punct_seq . . . . .	93
\__ctex_save_bounds:n . . . . .	95
\g__ctex_spa_iow . . . . .	98
\__ctex_write_family:nn . . . . .	87
\ctexspadef . . . . .	100
D	
\def . . . . .	127, 163
E	
\edef . . . . .	146, 147
\else . . . . .	158, 159, 193
\end . . . . .	116
\endcsname . . . . .	153, 155, 156, 157, 160, 162, 166
\endgroup . . . . .	146, 154, 169
\endinput . . . . .	151
\endlinechar . . . . .	125, 126
exp commands:	
\exp_args:No . . . . .	95
\expandafter . . . . .	128,
129, 153, 154, 155, 156, 157, 162, 166, 167	
\ExplSyntaxOff . . . . .	105
\ExplSyntaxOn . . . . .	86
F	
\fangsong . . . . .	1, 8, <u>78</u>
\fi . . . . .	158, 159, 168, 192, 212
G	
group commands:	
\group_begin: . . . . .	89
\group_end: . . . . .	103
H	
\heiti . . . . .	1, 8, <u>78</u>
I	
\iffalse . . . . .	173
\ifnum . . . . .	158
\ifx . . . . .	156, 157, 162
\ifzhmappdf . . . . .	172
\immediate . . . . .	165
\input . . . . .	85
int commands:	
\int_use:N . . . . .	96
iow commands:	
\iow_now:Nn . . . . .	98
K	
\kaishu . . . . .	1, 8, <u>78</u>
L	
\let . . . . .	149, 155
\long . . . . .	163
M	
\MAKESPA . . . . .	106
N	
\NewDocumentCommand . . . . .	78, 79, 80, 81
\noexpand . . . . .	147, 149, 150, 151

	<b>O</b>	<code>\special</code> . . . . .	194,
options:			195, 196, 197, 198, 199, 200, 201, 202,
	<code>X<sub>Y</sub>TeX</code> , <code>LuaTeX</code> . . . . .		203, 204, 205, 206, 207, 208, 209, 210, 211
	<code>pdfTeX</code> (generate DVI) . . . . .		
	<code>pdfTeX</code> (generate PDF) . . . . .		
	<code>upTeX</code> , <code>ApTeX</code> (aka <code>pTeX-ng</code> ) . . . . .		
	<b>P</b>	<b>T</b>	
<code>\pdfmapline</code> . . . . .	174,	tex commands:	
	175, 176, 177, 178, 179, 180, 181, 182,	<code>\tex_font:D</code> . . . . .	90
	183, 184, 185, 186, 187, 188, 189, 190, 191	<code>\tex_XeTeXcharglyph:D</code> . . . . .	96
<code>\pdfoutput</code> . . . . .	158	<code>\the</code> . . . . .	125, 128, 129, 148, 152
<code>\primitive</code> . . . . .	116	token commands:	
<code>\ProvidesExplFile</code> . . . . .	2	<code>\token_to_str:N</code> . . . . .	100
<code>\ProvidesFile</code> . . . . .	163, 170	<code>\toks</code> . . . . .	125, 126, 128, 129, 148, 152
		<b>U</b>	
	<b>R</b>	<code>\undefined</code> . . . . .	150
<code>\relax</code> . . . . .	120, 125, 128, 156, 157, 162	use commands:	
		<code>\use_i:nnn</code> . . . . .	3
	<b>S</b>	<code>\use_ii:nnn</code> . . . . .	4
scan commands:		<code>\use_iii:nnn</code> . . . . .	4
<code>\scan_stop:</code> . . . . .	90	<b>W</b>	
seq commands:		<code>\write</code> . . . . .	165
<code>\seq_map_inline:Nn</code> . . . . .	93		
<code>\setCJKfamilyfont</code> . . . . .	20, 22, 24, 26, 69, 71, 73, 75	<b>X</b>	
<code>\setCJKmainfont</code> . . . . .	10, 59	<code>\x</code> . . . . .	127, 130, 131, 132,
<code>\setCJKmonofont</code> . . . . .	18, 67		133, 134, 135, 136, 137, 138, 139, 140,
<code>\setCJKsansfont</code> . . . . .	16, 65		141, 142, 143, 144, 145, 146, 153, 163, 167
<code>\songti</code> . . . . .	1, 8, 78	<code>\xdef</code> . . . . .	166