

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

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Released 2026-01-18 v1.521M

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, L<sup>A</sup>T<sub>E</sub>X + 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): LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf |

This user-friendly interface is implemented in A.1, A.2, and A.3.

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/LxgwWenkaiGB-Lite/releases/latest/download/LXGWWenKaiGBLite-Regular.ttf>
- <https://github.com/lxgw/LxgwZhenKai/releases/latest/download/LXGWZhenKaiGB-Regular.ttf>

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

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

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## 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**”, and missing character markers are provided with punctuation compression disabled.

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

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 私 | 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 | 。 | 我 | 可 | 以 | 食 | 玻 | 璃 | ， | 佢 | 傷 | 唔 | 到 | 我 | 。 |

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

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 私 | 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 | 。 | 我 | 可 | 以 | 食 | 玻 | 璃 | ， | 佢 | 傷 | 唔 | 到 | 我 | 。 |

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

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 私 | 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 | 。 | 我 | 可 | 以 | 食 | 玻 | 璃 | ， | 佢 | 傷 | 唔 | 到 | 我 | 。 |

霞鶯 文楷/隸楷 (LXGW WenKai/ZhenKai) LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 私 | 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 | 。 | 我 | 可 | 以 | 食 | 玻 | 璃 | ， | 佢 | 傷 | 唔 | 到 | 我 | 。 |

## 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} {2026-01-18} {v1.521M}
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 { ctexpunct-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 = LXGWWenKaiGBLite-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 } { LXGWWenKaiGBLite-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 { lrgw }
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-lrgw.tex` (see A.3) for `zhmatrices` and set `\CJKrmdefault`, `\CJKsfdefault`, `\CJKttdefault`, respectively.

```

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

```

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

```

38         \ctex_punct_set:n { lrgw }
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 { lrgw } }
44 }

```

upTeX, ApTeX (aka pTeX-ng) For those use upTeX + DVIPDFMx. Configure the basic font mapping for upTeX. 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     { LXGWNNeoZhiSong.ttf }
48     { LXGWNNeoZhiSongScreen.ttf }
49     { LXGWWenKaiGBLite-Regular.ttf }
50     { LXGWNNeoXiHei.ttf }
51     { LXGWNNeoXiHeiScreen.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     = LXGWWenKaiGBLite-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 } { LXGWWenKaiGBLite-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>
```

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

```
84 \input ctex-spa-macro %
```

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

```

85 \MAKESPA {ctexpunct-lxgw.tex}
86 {
87   {lxgwwzhsong}      {LXGWNeoZhiSong} ,
88   {lxgwwzhsongb}    {LXGWNeoZhiSongScreen} ,
89   {lxgwwzhhei}      {LXGWNeoXiHei} ,

```

```

90     {lxgwwzhheib}      {LXGWNeoXiHeiScreen} ,
91     {lxgwwzhfs}       {LXGWZhuqueFangsong-Regular} ,
92     {lxgwwzhkai}      {LXGWWenKaiGBLite-Regular} ,
93     {lxgwwzhkaib}     {LXGWZhenKaiGB-Regular} ,
94 }

```

End of the script.

```

95 \primitive\end

```

End the optionlist zhmap for l3docstrip.

```

96 </makespa>

```

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

Start the optionlist zhmap for l3docstrip.

```

97 <*zhmap>

```

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

```

98 \begingroup\catcode61\catcode48\catcode32=10\relax%
99   \catcode 35=6   % #
100   \catcode 45=12  % -
101   \catcode123=1   % {
102   \catcode125=2   % }
103   \toks0{\endlinechar=\the\endlinechar\relax}%
104   \toks2{\endlinechar=-1}%
105   \def\x#1 #2 {%
106     \toks0\expandafter{\the\toks0 \catcode#1=\the\catcode#1\relax}%
107     \toks2\expandafter{\the\toks2 \catcode#1=#2 }}%
108   \x 13 5 % carriage return
109   \x 32 10 % space
110   \x 35 6 % #
111   \x 40 12 % (
112   \x 41 12 % )
113   \x 45 12 % -
114   \x 46 12 % .
115   \x 47 12 % /
116   \x 58 12 % :
117   \x 60 12 % <
118   \x 61 12 % =
119   \x 64 11 % @
120   \x 91 12 % [
121   \x 93 12 % ]
122   \x 123 1 % {
123   \x 125 2 % }
124   \edef\x#1{\endgroup%
125     \edef\noexpand#1{%
126       \the\toks0 %
127       \let\noexpand\noexpand\noexpand#1%
128       \noexpand\noexpand\noexpand\undefined%
129       \noexpand\noexpand\noexpand\endinput}%
130     \the\toks2}%
131   \expandafter\x\csname ctex@zhmap@endinput\endcsname
132 \begingroup\expandafter\endgroup

```

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

```

133 \expandafter\let\csname ifzhmappdf\expandafter\endcsname\csname
134 \expandafter\ifx\csname ifctexpdf\endcsname\relax
135 \expandafter\ifx\csname pdfoutput\endcsname\relax
136   \iffalse\else\ifnum\pdfoutput < 1 \iffalse\else \iftrue\fi\fi
137 \else ifctexpdf\fi
138 \endcsname
139 \begingroup
140 \expandafter\ifx\csname ProvidesFile\endcsname\relax
141 \long\def\x#1\ProvidesFile#2[#3]{%
142   #1%
143   \immediate\write-1{File: #2 #3}%
144   \expandafter\xdef\csname ver@#2\endcsname{#3}}
145 \expandafter\x%
146 \fi
147 \endgroup

```

Provides the identification information of the font map loader.

```

148 \ProvidesFile{ctex-zhmap-lxgw.tex}%
149 [2026-01-18 v1.521M lxgw font map loader for DVIPDFMx (CTEX)]

```

Font map loader for pdf<sub>TeX</sub> (generate PDF) is disabled since pdf<sub>TeX</sub> maps too slowly.

```

150 \ifzhmappdf

```

Configuration for pdf<sub>TeX</sub> (generate DVI).

```

151 \else

```

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

```

152 \special{pdf:mapline gbk@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
153 \special{pdf:mapline gbksong@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
154 \special{pdf:mapline gbkkai@UGBK@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf}
155 \special{pdf:mapline gbkhei@UGBK@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
156 \special{pdf:mapline gbkfs@UGBK@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf}
157 \special{pdf:mapline cyberb@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
158 \special{pdf:mapline unisong@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf}
159 \special{pdf:mapline unikai@Unicode@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf}
160 \special{pdf:mapline unihei@Unicode@ UniGB-UTF16-H LXGWNeoXiHei.ttf}
161 \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.

```

162 \special{pdf:mapline gbksongsl@UGBK@ UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
163 \special{pdf:mapline gbkkaisl@UGBK@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf -s .167}
164 \special{pdf:mapline gbkheisl@UGBK@ UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
165 \special{pdf:mapline gbkfssl@UGBK@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
166 \special{pdf:mapline unisongsl@Unicode@ UniGB-UTF16-H LXGWNeoZhiSong.ttf -s .167}
167 \special{pdf:mapline unikaisl@Unicode@ UniGB-UTF16-H LXGWWenKaiGBLite-Regular.ttf -s .167}
168 \special{pdf:mapline uniheisl@Unicode@ UniGB-UTF16-H LXGWNeoXiHei.ttf -s .167}
169 \special{pdf:mapline unifssl@Unicode@ UniGB-UTF16-H LXGWZhuqueFangsong-Regular.ttf -s .167}
170 \fi

```

End the optionlist `zhmap` for `l3docstrip`.

```

171 </zhmap>

```

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