

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

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This package packs a selection of open-source fonts from the 霞鹜文楷, 霞鹜文楷<sup>国标</sup>, 霞鹜臻楷, 霞鹜漫黑, 小赖字体, and 悠哉字体, which are released into public domain by LXGW 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` package

```
\usepackage[fontset = lxgw]{ctex}
```

or the `ctex` classes

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

with Xe<sub>La</sub>TeX, Lua<sub>La</sub>TeX,  $\LaTeX$  + DVIPDFMx, and up $\LaTeX$  + DVIPDFMx supported. pdf $\LaTeX$  is not supported temporarily since the long mapping time of `zhmap`. Additionally, the following four commands are provided for convenience.

<code>\songti</code>	宋体 (CJKmainfont): LXGWWenKaiGBLite-Regular.ttf, LXGWZhenKaiGB-Regular.ttf.
<code>\heiti</code>	黑体 (CJKsansfont): LXGWMarkerGothic-Regular.ttf (with AutoFakeBold option).
<code>\fangsong</code>	仿宋 (CJKmonofont): LXGWXiaolai-Regular.ttf.
<code>\kaishu</code>	楷书 (itshape of CJKmainfont): LXGWYozai-Regular.ttf, LXGWYozai-Medium.ttf.

Note that the names of the four control sequences make no sense here, just to keep the same naming habit of `ctex-kit`.

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

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

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

霞鹜文楷 (LXGW WenKai) 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。ㄟㄟㄟ

霞鹜文楷 国标 (LXGW WenKaiGB) LXGWWenKaiGBLite-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。ㄟㄟㄟ

霞鹜漫黑 (LXGW Marker Gothic) LXGWMarkerGothic-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。ㄟㄟㄟ

小赖字体 (Xiaolai Font) LXGWXiaolai-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。ㄟㄟㄟ

悠哉字体 (Yozai Font) LXGWYozai-Regular.ttf, LXGWYozai-Medium.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。ㄟㄟㄟ

## 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} {2025-12-08} {v1.521G}
3 {lxgw fontset configuration for ctex-kit}
```

Load CJK font family, interface provided by ctex-kit.

```
4 \ctex_fontset_case:nnnn
```

The pdf<sub>T</sub><sub>E</sub>X (generate PDF directly) branch is no longer supported for the LXGW font family. Here will raise a `fontset-unavailable` error.

```
5 { \ctex_fontset_error:n { lxgw } }
6 {
```

The pdf<sub>T</sub><sub>E</sub>X (generate DVI) branch.

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 default unicode cmap (Character To Glyph Index Mapping Table), not UniGB-UTF16-H.

```
9 {
10   \setCJKmainfont { LXGWWenKaiLite-Regular.ttf }
11   [
12     BoldFont = LXGWZhenKaiGB-Regular.ttf,
13     ItalicFont = LXGWYozai-Regular.ttf,
14   ]
15   \setCJKsansfont { LXGWMarkerGothic-Regular.ttf } [ AutoFakeBold ]
16   \setCJKmonofont { LXGWXiaolai-Regular.ttf } [ AutoFakeBold ]
17   \setCJKfamilyfont { zhsong } { LXGWWenKaiLite-Regular.ttf }
18   [ BoldFont = LXGWZhenKaiGB-Regular.ttf ]
19   \setCJKfamilyfont { zhhei } { LXGWMarkerGothic-Regular.ttf }
20   [ AutoFakeBold ]
21   \setCJKfamilyfont { zhfs } { LXGWXiaolai-Regular.ttf }
22   [ AutoFakeBold ]
23   \setCJKfamilyfont { zhkai } { LXGWYozai-Regular.ttf }
24   [ BoldFont = LXGWYozai-Medium.ttf ]
```

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

```
25 \ctex_punct_set:n { lxgw }
26 \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
27 \ctex_punct_map_family:nn { \CJKsfdefault } { zhhei }
28 \ctex_punct_map_family:nn { \CJKttdefault } { zhfs }
29 \ctex_punct_map_bfseries:nn { \CJKrmdefault, zhsong } { zhsongb }
30 \ctex_punct_map_bfseries:nn { \CJKsfdefault, zhhei } { zhheib }
31 \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
32 }
```

#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-lxgw.tex` for `zhmatrices` and set `\CJKrmdefault`, `\CJKsfdefault`, `\CJKttdefault` respectively.

```
33 {
34   \ctex_load_zhmap:nnnn { rm } { zhhei } { zhfs } { lxgw }
```

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

```
35   \ctex_punct_set:n { lxgw }
36   \ctex_punct_map_family:nn { \CJKrmdefault } { zhsong }
37   \ctex_punct_map_bfseries:nn { \CJKrmdefault } { zhhei }
38   \ctex_punct_map_itshape:nn { \CJKrmdefault } { zhkai }
39 }
```

#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.

```
40   { \ctex_fontset_error:n { lxgw } }
41 }
```

The `upTeX` branch.

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.

```
42 {
43   \ctex_set_upmap_unicode:nnn { upserif }
44     { LXGWWenKaiLite-Regular.ttf } { LXGWZhenKaiGB-Regular.ttf }
45   \ctex_set_upmap_unicode:nnn { upsans }
46     { LXGWMarkerGothic-Regular.ttf } { }
47   \ctex_set_upmap_unicode:nnn { upmono }
48     { LXGWXiaolai-Regular.ttf } { }
49   \ctex_set_upmap_unicode:nnn { upserifit }
50     { LXGWYozai-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.

```
51   \ctex_set_upfamily:nnn { zhsong } { upzhserif } { upzhserifb }
52   \ctex_set_upfamily:nnn { zhhei } { upzhsans } { }
53   \ctex_set_upfamily:nnn { zhfs } { upzhmono } { }
54   \ctex_set_upfamily:nnn { zhkai } { upzhserifit } { }
55 }
```

The `XYTeX/LuaTeX` branch.

```
56 {
57   \setCJKmainfont { LXGWWenKaiLite-Regular }
58   [
59     Extension = .ttf,
60     BoldFont = LXGWZhenKaiGB-Regular,
```

```

61     ItalicFont = LXGWYozai-Regular
62   ]
63   \setCJKsansfont { LXGWMarkerGothic-Regular }
64   [ Extension = .ttf, AutoFakeBold ]
65   \setCJKmonofont { LXGWXiaolai-Regular      }
66   [ Extension = .ttf, AutoFakeBold ]
67   \setCJKfamilyfont { zhsong } { LXGWWenKaiLite-Regular }
68   [ Extension = .ttf, BoldFont = LXGWZhenKaiGB-Regular ]
69   \setCJKfamilyfont { zhhei } { LXGWMarkerGothic-Regular }
70   [ Extension = .ttf, AutoFakeBold ]
71   \setCJKfamilyfont { zhfs   } { LXGWXiaolai-Regular      }
72   [ Extension = .ttf, AutoFakeBold ]
73   \setCJKfamilyfont { zhkai  } { LXGWYozai-Regular        }
74   [ Extension = .ttf, BoldFont = LXGWYozai-Medium ]
75 }

```

**\songti** Shortcuts that same as those in the ctex-kit.

```

\heiti 76 \NewDocumentCommand \songti { } { \CJKfamily { zhsong } }
\fangsong 77 \NewDocumentCommand \heiti { } { \CJKfamily { zhhei } }
\kaishu 78 \NewDocumentCommand \fangsong { } { \CJKfamily { zhfs } }
79 \NewDocumentCommand \kaishu { } { \CJKfamily { zhkai } }

```

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

End the optionlist fontset for l3docstrip.

```
80 </fontset>
```

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

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

```
81 <*makespa>
```

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

```
82 <@@=ctex>
```

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

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

However, the macro file needs to be hacked due to the interface change of XeTeX.

```

84 \ExplSyntaxOn
85 \cs_set_protected:Npn \__ctex_write_family:nn #1#2
86 {
87   \group_begin:
88   \tex_font:D \l__ctex_punct_font = "[#2]" ~ at ~ 100 pt \scan_stop:
89   \l__ctex_punct_font
90   \clist_clear:N \l__ctex_punct_bounds_clist

```

```

91     \seq_map_inline:Nn \c__ctex_punct_seq
92     {
93         \exp_args:No \__ctex_save_bounds:n
94         { \int_use:N \tex_XeTeXcharglyph:D ##1 }
95     }
96     \iow_now:Nx \g__ctex_spa_iow
97     {
98         \token_to_str:N \ctexspadef {#1}
99         { \l__ctex_punct_bounds_clist , , , }
100    }
101    \group_end:
102 }
103 \ExplSyntaxOff

```

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

```

104 \MAKESPA {ctexpunct-lxgw.spa}
105 {
106     {lxgwwzhong}      {LXGWWenKaiLite-Regular} ,
107     {lxgwwzhongb}     {LXGWWenKaiGB-Regular} ,
108     {lxgwwgbzhong}    {LXGWWenKaiGBLite-Regular} ,
109     {lxgwwgbzhongb}   {LXGWWenKaiGB-Regular} ,
110     {lxgwwzhhei}      {LXGWWMarkerGothic-Regular} ,
111     {lxgwwzhfs}       {LXGWWXiaolai-Regular} ,
112     {lxgwwzhkai}      {LXGWWYozai-Regular} ,
113     {lxgwwzhkaib}     {LXGWWYozai-Medium} ,
114 }

```

End of the script.

```

115 \primitive\end

```

Restore the module name.

```

116 <@@=

```

End the optionlist zhmap for l3docstrip.

```

117 </makespa>

```

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

Start the optionlist zhmap for l3docstrip.

```

118 <*zhmap>

```

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

```

119 \begingroup\catcode61\catcode48\catcode32=10\relax%
120 \catcode 35=6 % #
121 \catcode 45=12 % -
122 \catcode123=1 % {
123 \catcode125=2 % }
124 \toks0{\endlinechar=\the\endlinechar\relax}%
125 \toks2{\endlinechar=-1}%
126 \def\x#1 #2 {%
127     \toks0\expandafter{\the\toks0 \catcode#1=\the\catcode#1\relax}%
128     \toks2\expandafter{\the\toks2 \catcode#1=#2}}%
129 \x 13 5 % carriage return
130 \x 32 10 % space

```

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

```

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

```

Provides the identification information of the font mapping file.

```

169 \ProvidesFile{ctex-zhmap-lxgw.tex}%
170 [2025-12-08 v1.521G lxgw font map loader for DVIPDFMx (CTEX)]

```

The font mapping configurations.

```

171 \ifzhmappdf \iffalse
172 \pdfmapline{=gbk@UGBK@ <LXGWenKaiLite-Regular.ttf}
173 \pdfmapline{=gbksong@UGBK@ <LXGWenKaiLite-Regular.ttf}
174 \pdfmapline{=gbkkai@UGBK@ <LXGWYozai-Regular.ttf}
175 \pdfmapline{=gbkhei@UGBK@ <LXGWMarkerGothic-Regular.ttf}
176 \pdfmapline{=gbkfs@UGBK@ <LXGWXiaolai-Regular.ttf}
177 \pdfmapline{=cyberb@Unicode@ <LXGWenKaiLite-Regular.ttf}
178 \pdfmapline{=unisong@Unicode@ <LXGWenKaiLite-Regular.ttf}
179 \pdfmapline{=unikai@Unicode@ <LXGWYozai-Regular.ttf}
180 \pdfmapline{=unihei@Unicode@ <LXGWMarkerGothic-Regular.ttf}
181 \pdfmapline{=unifs@Unicode@ <LXGWXiaolai-Regular.ttf}

```

```

182 \pdfmapline{=gbksongsl@UGBK@ <LXGWenKaiLite-Regular.ttf}
183 \pdfmapline{=gbkkaisl@UGBK@ <LXGWYozai-Regular.ttf}
184 \pdfmapline{=gbkheisl@UGBK@ <LXGWMarkerGothic-Regular.ttf}
185 \pdfmapline{=gbkfssl@UGBK@ <LXGWXiaolai-Regular.ttf}
186 \pdfmapline{=unisongsl@Unicode@ <LXGWenKaiLite-Regular.ttf}
187 \pdfmapline{=unikaisl@Unicode@ <LXGWYozai-Regular.ttf}
188 \pdfmapline{=uniheisl@Unicode@ <LXGWMarkerGothic-Regular.ttf}
189 \pdfmapline{=unifssl@Unicode@ <LXGWXiaolai-Regular.ttf}

```

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

```

190 \fi \else
191 \special{pdf:mapline gbk@UGBK@ unicode LXGWenKaiLite-Regular.ttf}
192 \special{pdf:mapline gbksong@UGBK@ unicode LXGWenKaiLite-Regular.ttf}
193 \special{pdf:mapline gbkkai@UGBK@ unicode LXGWYozai-Regular.ttf}
194 \special{pdf:mapline gbkhei@UGBK@ unicode LXGWMarkerGothic-Regular.ttf}
195 \special{pdf:mapline gbkfs@UGBK@ unicode LXGWXiaolai-Regular.ttf}
196 \special{pdf:mapline cyberb@Unicode@ unicode LXGWenKaiLite-Regular.ttf}
197 \special{pdf:mapline unisong@Unicode@ unicode LXGWenKaiLite-Regular.ttf}
198 \special{pdf:mapline unikai@Unicode@ unicode LXGWYozai-Regular.ttf}
199 \special{pdf:mapline unihei@Unicode@ unicode LXGWMarkerGothic-Regular.ttf}
200 \special{pdf:mapline unifs@Unicode@ unicode LXGWXiaolai-Regular.ttf}
201 \special{pdf:mapline gbksongsl@UGBK@ unicode LXGWenKaiLite-Regular.ttf -s .167}
202 \special{pdf:mapline gbkkaisl@UGBK@ unicode LXGWYozai-Regular.ttf -s .167}
203 \special{pdf:mapline gbkheisl@UGBK@ unicode LXGWMarkerGothic-Regular.ttf -s .167}
204 \special{pdf:mapline gbkfssl@UGBK@ unicode LXGWXiaolai-Regular.ttf -s .167}
205 \special{pdf:mapline unisongsl@Unicode@ unicode LXGWenKaiLite-Regular.ttf -s .167}
206 \special{pdf:mapline unikaisl@Unicode@ unicode LXGWYozai-Regular.ttf -s .167}
207 \special{pdf:mapline uniheisl@Unicode@ unicode LXGWMarkerGothic-Regular.ttf -s .167}
208 \special{pdf:mapline unifssl@Unicode@ unicode LXGWXiaolai-Regular.ttf -s .167}
209 \fi

```

End the optionlist zhmap for l3docstrip.

```

210 </zhmap>

```

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