Contents

I zhspacing.sty 3

1 Introduction 3

2 Getting Started 3

3 Advanced Usage 5

3.1 Fonts 5

3.2 More on Fonts 7

3.3 Skips 7

3.4 Vertical Chinese 9

3.5 Compatibility 10

3.6 Working with other Chinese package 10

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File I
zhspacing.sty

1 Introduction

XƎTEX is a new TƎX engine by Jonathan Kew and SIL International, which combines ϵ-TEx with pervasive Unicode support and advanced font support. Using XƎTEX, it is possible to typeset scripts of any languages whose glyphs are contained in the font in use, without the help of any extra packages, such as CJK.

However, XƎTEX itself does not solve all the problems. Some details in Chinese typesetting have not been dealt with by XƎTEX, such as the automatic font switch between Chinese and Western characters, the skip adjustment of fullwidth punctuations, the automatic skip insertion between Chinese and Western characters or math formulas, etc.

To meet the need of easy and high quality typesetting of Chinese documents using XƎTEX, the package zhspacing is coded, utilizing the new primitive of \XeTeXinterchartoks provided in XƎTEX version 0.997.

2 Getting Started

zhspacing can be used in both plain XƎTEX or XƎL. The usage is quite straightforward. For instance, in plain XƎTEX,

\input zhspacing.sty
\zhspacing

这是中文测试。中文和English的混排。中文和$E=mc^2$的混排。
\bye

1Words copied from the ConTeXt Wiki.
2CJK is a LaTeX 2e macro package which enables the use of CJK scripts (Chinese/Japanese/Korean) in various encodings, written by Werner Lemberg.
And in XƎLATEX,
\begin{verbatim}
documentclass{article}
usepackage{zhspcing}
zhspcing
\begin{document}
这是中文测试。中文和English的混排。中文和$E=mc^2$的混排。
\end{document}
\end{verbatim}

Both of the examples above produce the same result as follows,

这是中文测试。中文和English的混排。中文和$E=mc^2$的混排。

As you can see, spaces after Chinese characters are always ignored. Moreover, a noticeable skip is inserted between Chinese characters and English characters as well as math formulas. In fact, all of the following inputs can produce mixed language output with skip automatically inserted between Chinese and English characters,

\begin{verbatim}
中文Eng文，中文Eng文，中文Eng文 and 中 Eng文.
\end{verbatim}

And their corresponding output is,

中文Eng文，中文Eng文，中文Eng文 and 中Eng文.

Look close and you’ll find, that the first and second input generates exactly the same output, and so does the third and fourth. However, the skip between Eng and 文 in the last two cases is wider than the skip between 中 and Eng. That is because the space is produced by the space token after the letter g, not the skip automatically inserted by zhspcing’s skip mechanism.

The space ignoring and skip auto-inserting ability of zhspcing can make writing documents much comfortable. You don’t need to worry about the manual insertion of skips such as adding the annoying - in CJK.

Now come to the topic of punctuation skip adjustment. Proper Chinese typesetting requires consecutive fullwidth punctuations be compressed, and a linebreak before or after a fullwidth punctuation will cut off the blank spaces of this punctuation, making it align to the margin. zhspcing does have solved these problems, as well as proper prohibitions(禁则). Here’s an example.
他强调，“三个代表”重要思想是在新的历史条件下运用马克思主义的立场、观点和方法的典范，是我们学习马克思主义的立场、观点和方法最现实、最生动的教材。“三个代表”重要思想是与时俱进的理论。

3 Advanced Usage

3.1 Fonts

zhspacing uses an extensible way of selecting fonts. The rules can be summarized as follows,

- Western characters, i.e. those that are not CJKV ideographies nor CJKV punctuations, use the same font as default.

- Chinese characters use separate fonts. Font changes in the document does not affect the font used to display Chinese, unless you are using NFSS and change the font series or shape.

- On displaying basic Chinese ideographies, execute the command \zhfont.

- On displaying Chinese punctuations, execute the command \zhpunctfont.

- On displaying CJK Ext-A characters, execute the command \zhcjkextafont.

- On displaying CJK Ext-B characters, execute the command \zhcjkextbfont.

- When switching from non-Chinese characters to Chinese characters, execute \zhs@savefont. When switching back, execute \zhs@restorefont.

When importing zhspacing from plain XƎTEX, the default definitions of the above commands are,
When imported from \LaTeX, the defaults are,

```
\newfontfamily\zhfont[BoldFont=SimHei]{SimSun}
\newfontfamily\zhpunctfont{SimSun}
\def\zhcjkextafont{\message{CJK Ext-A}}
\def\zhcjkextbfont{\message{CJK Ext-B}}
\let\zhs@savefont=\begingroup
\let\zhs@restorefont=\endgroup
```

Here \zhs@savefont and \zhs@restorefont are internal macros to save and restore the NFSS info of the current font to specified places.

CJK Ext-A/B fonts have not been defined by default in consideration that not every user has installed the particular fonts. I recommend to use Sun-ExtA and Sun-ExtB as the corresponding fonts. You can define the ext-font macros manually in a similar way to the definition of \zhfont.

An example of mixed typesetting of various classes of characters is as follows, cited from The Tale of Kiều.

[
{
兼容
越南文字符

Trăm năm, trong cõi người ta, lòng

Chữ tài, chữ mệnh, khéo là ghét nhau.

Trải qua một cuộc bể dâu,

Những điều trông thấy mà đau đớn lòng.

}\n]

\footnote{3《金云翘传》，或Truyện Kiều, a Vietnamese luc bát poem written in chữ Nôm. Chữ Nôm is a system of ideographies created by the Vietnamese laboring people, most of which are encoded in CJK Ext-A/B area, or not even included in Unicode.}

\footnote{4Some of the ideographies are replaced by similar characters due to the limitation of character set. A picture of the original manuscript can be found at this link.}
3.2 More on Fonts

Sometimes it may be desirable to use different Chinese fonts for different NFSS font families in \LaTeX. This can be done by changing the definition of \texttt{\zhs@savefont} and \texttt{\zhfont}, without modifying the \texttt{zhspacing} source.

Here is the way to do it:

\makeatletter
\g@addto@macro\zhs@savefont{%
\long\edef\zhs@tmpmacro{\f@family}\
\def\zhs@curr@fam{0}\
\ifx\zhs@tmpmacro\sfdefault
\def\zhs@curr@fam{1}\
\else\ifx\zhs@tmpmacro\ttdefault
\def\zhs@curr@fam{2}\
\fi\fi
\edef\zhs@tmpmacro{\f@family}\
\ifx\zhs@tmpmacro\sfdefault
\def\zhs@curr@fam{1}\
\else\ifx\zhs@tmpmacro\ttdefault
\def\zhs@curr@fam{2}\
\fi\fi
}\fi\fi

\newfontfamily\zhrmfont[\BoldFont=SimHei,\nItalicFont=KaiTi]{SimSun}
\newfontfamily\zhsffont{SimHei}
\newfontfamily\zhttfont[\BoldFont=SimHei]{KaiTi}
\def\zhfont{\ifcase\zhs@curr@fam\zhrmfont\or\zhsffont\or\zhttfont\else\zhrmfont\fi}

3.3 Skips

The skip mechanism in \texttt{zhspacing} is also flexible. \texttt{zhspacing} utilizes the following skip commands. Note that they are defined as macros instead of skip register values, in order that the skip varies according to font size changes.

\footnote{See \texttt{zhfont.sty} later for convenient ways.}
\skipzh Skip between adjacent Chinese characters.
\skipenzh Skip between a Chinese character and a Western character or a math formula.
\skipzhopen Skip before fullwidth opening punctuations, such as ““”, “(”, “《”, etc.
\skipzhinteropen Skip before a fullwidth opening punctuation when preceded by another fullwidth punctuation.
\skipzhlinestartopen Skip before a fullwidth opening punctuation when it occurs at the start of a line.
\skipzhclose Skip after fullwidth closing punctuations, such as “””, “)””, “》”, etc.
\skipzhinterclose Skip after a fullwidth closing punctuation when followed by another fullwidth punctuation.
\skipzhlineendclose Skip after a fullwidth closing punctuation when it occurs at the end of a line.
\skipzhfullstop Skip after fullwidth fullstop punctuations, such as “;”, “.”, “，”, “。”, etc.
\skipzhinterfullstop Skip after a fullwidth fullstop punctuation when followed by another fullwidth punctuation.
\skipzhlineendfullstop Skip after a fullwidth fullstop punctuation when it occurs at the end of a line.
\skipzhhalfstop Skip after fullwidth halfstop punctuations, such as “、”, “’, “：”, “””, etc.
\skipzhinterhalfstop Skip after a fullwidth halfstop punctuation when followed by another fullwidth punctuation.
\skipzhlineendhalfstop Skip after a fullwidth halfstop punctuation when it occurs at the end of a line.
\skipnegzhlinestartopen Negative skip to \skipzhlinestartopen.
Negative skip to \skipzhlineendclose.

Negative skip to \skipzhlineendfullstop.

Negative skip to \skipzhlineendhalfstop.

All of the skip commands above are defined in the pattern 
\def\skipxxx{\hskip xxxxx}.

zhspacing comes with three pre-defined skip schemes, namely \simsunskipscheme, \emptyskipscheme and \haltskipscheme. The first scheme should be suitable for font SimSun and other popular Chinese fonts used in China, which does not support OpenType features of halt, and needs negative spaces be inserted before opening punctuations and after closing or judou punctuations. The second scheme simply adds zero length. And the last one should be fit for OpenType Chinese fonts supporting halt feature such as Adobe Song Std, where positive spaces should be inserted before or after certain punctuations. You can define your own skip schemes for customization, of course.

### 3.4 Vertical Chinese

Vertical Chinese can be achieved by adding raw feature vertical to the specified font. An example could be,

\begin{verbatim}
\documentclass[12pt]{article}
\usepackage{graphicx}
\usepackage{zhspacing}
\newfontlanguage{Chinese}{CHN}
\newfontfamily{zhfont}[Script=CJK, Language=Chinese, Vertical=RotatedGlyphs]{SimSun}
\let\zhpunctfont{zhfont}
\haltskipscheme
\zhspacing
\begin{document}
\rotatebox{-90}{我是中国人，我爱自己的祖国。}
\end{document}
\end{verbatim}
Note that in this example, in order to have proper vertical punctuations, we set \zhpunctfont to use the Adobe one supporting vert feature, and change the skip scheme to \haltskipscheme to match the vhal feature specified.

However, there exists some bug in typesetting vertical Chinese containing punctuations using some fonts such as \fontname{KaiTi_GB2312} etc. I’ve told this bug to jjgod in May, but it seems that he hasn’t solved the problem yet. Moreover, the baseline of vertical Chinese is not correct, so mixed typesetting of Chinese and English in vertical mode generates ugly results, and thus should be avoided.

3.5 Compatibility

Theoretically, \zhspacing should be compatible with all macro packages, except those who change the definition of \hskip and \penalty, in which case special treatment should be applied. I haven’t found any conflict when using common packages such as hyperref and fancyhdr. However, ulem redefines \hskip and \penalty, and causes unexpected output. Use zhulem provided along with zhspacing instead.

zhspacing may be not compatible with macro packages which use \fontname{XeTeXinterchartoks} faculty. For example, the polyglossia package (some languages).

3.6 Working with other Chinese package

\zhspacing is not compatible with xeCJK. The latter can be only used in \LaTeX format. \zhspacing is now supposed to be mainly used in Plain \TeX format; in \LaTeX, xeCJK is a better choice.

\footnote{I was using \begingroup and \endgroup as the font saving/restoring commands. However, I found ulem redefines \hskip and \penalty to end the current hbox group and start a new hbox, and thus group mismatch occurs. So I changed the font saving/restoring commands when used in \LaTeX, using NFSS info instead of groups. But in the new hbox group, no Chinese font is applied by default so the Chinese characters disappears. Therefore I changed the definitions of ulem’s new \hskip and \penalty in zhulem, and advice users to use this modified one.}
The `ctex` package, made by `ctex.org`, is a widely used Chinese document framework which hides the underlying Chinese processing details to the user, which enables portability between different Chinese processing packages or systems. New version of `ctex` package supports XƎTƎX through `xeCJK` package, `zhspacing` is not necessary.

To use `zhspacing` in `cxetex`, a slight modification of the file `ctexcjk.clo` should be made. Change the corresponding lines to the follows (% means the original lines).

\begin{verbatim}
\%\XeTeXlinebreaklocale "zh"
\%\XeTeXlinebreakskip = 0pt plus 1pt minus 0.1pt
\%\setmainfont[BoldFont={cwTeXHeiBold},
\%ItalicFont={cwTeXKaiItalic},
\%Mapping=tex-text]{cwTeXMing}
\%\setsansfont[BoldFont={cwTeXHeiBold},Mapping=tex-text]{cwTeXYen}
\%\setmonofont{cwTeXFangSongTT}
\usepackage{zhspacing}
\newfontfamily\zhfont[BoldFont=SimHei]{SimSun}
\newfontfamily\zhcjkextafont{Sun-ExtA}
\newfontfamily\zhcjkextbfont{Sun-ExtB}
\zhspacing
\end{verbatim}

You can surely change these lines to your own taste.

4 Getting `zhspacing`

You can get latest stable version of `zhspacing` on CTAN.

`zhspacing` was hosted on an open-source project at google-code. The old project homepage is `http://code.google.com/p/zhspacing/`.

Now `zhspacing` is part of `ctex-kit` project (`https://github.com/CTeX-org/ctex-kit/`). You can get the lastest source via Git.
1 Introduction

To simplify the complex font setting to use NFSS in \LaTeX, the package zhfont is coded. It also adds simple interface to define fonts with fake slant, and also supports fake bold.

2 Package Options

zhfont currently has only one option — fakebold. This option sets Chinese show fake boldface when the current series is bold.

3 Provided Macros

- \zhrmfont
- \zhsffont
- \zhttfont

The font commands to be executed according to the current font family. You can redefine them to customize your fonts.

- \setzhmainfont
- \setzhfsansfont
- \setzhmonofont

Simply macro to set \zh{rm/sf/tt}font using \newfontfamily.

- \newfontfamilywithslant

Create a font family with fake slant. Take one argument as the font name.

  Example: \newfontfamilywithslant\zhrmfont{SimSun}

- \newfontfamilywithslantandbold

Create a font family with fake slant, and specify another font for its boldface. Take two arguments as the font name and bold font name.

  Example:
  \newfontfamilywithslantandbold\zhrmfont{SimSun}{SimHei}
4 Examples

The following example is generated with \texttt{zhfont} loaded with option \texttt{fakebold}.

\begin{verbatim}
\newfontfamilywithslant\zhrmfont{SimSun}
中文\textbf{测试}。\textit{中文\textbf{测试}}。
\newfontfamilywithslant\zhrmfont{FangSong}
中文\textbf{测试}。\textit{中文\textbf{测试}}。
\end{verbatim}

中文测试。中文测试。中文测试。中文测试。

File III

zhmath.sty

1 Introduction

\texttt{zhmath} is a generic package which allows the Chinese characters to be displayed in math formulas. It also allows changing the math font for alphas and numbers.

\texttt{zhmath} only sets the basic Chinese characters to be displayable, not CJK Ext-A/B ones, as they are seldom used and discouraged in math. You can use \texttt{\hbox} to let \texttt{zhspacing} display them, however.

2 Package Options

In \LaTeX, \texttt{zhmath} has two options — \texttt{active} and \texttt{noactive}. They set the method to implement Chinese character displaying in math. The default is \texttt{noactive}.

When \texttt{active} is set, the Chinese characters in math formulas are set to active, which, when executed, display the corresponding characters in \texttt{zhmathfont}. This behavior is much like that of the
package mathcjk. The font size in different styles are also set in \mathcjksizea/b/c/d.

When noactive is set, the mathcodes of Chinese characters are set to use a special math font family to display them. This way is more native than to use active characters.

Both active and noactive have disadvantages. In active mode the Chinese math font sizes are determined by \mathcjksizea/b/c/d, so they are somewhat independent with the main text size, which means their size cannot change when the main font size changes, which gives ugly results. However, in noactive mode, although Chinese math font size varies with the main font size, Chinese inside \mathtex etc cannot be displayed, because the math font family are set to \mathtex's. So choose the option to your own need.

In plain \TeX no package options are available.

3 Provided Macros

\setzhmathfont
Set the math font used to display Chinese. Take one argument as the font command. Preamble only.

\zhmathfont
The font command which determines the math font for Chinese. However, if you use noactive option in \LaTeX, or you’re in plain \TeX, they are not executed when Chinese in math occur, but when \setzhmathfont is invoked. So you should always call \setzhmathfont\zhmathfont after the change.

\usecustommathfonts
Enable the use of custom math fonts for alphas and numbers. The default is Times New Roman.

\setalphanummathfonts
Set the math font used to display alphas and numbers. Preamble only. Take one argument as the font family in \LaTeX, and two argument as the font command for alphas and numbers accordingly in plain \TeX.
\zhmathalphanumfont
The font command which determines the math font for alphas and numbers in \LaTeX. Should always call \setalphanummathfonts \zhmathalphanumfont after it changes.

\zhmathletterfont
\zhmathnumberfont
The font command which determines the math font for alphas and numbers in plain \TeX. After their change \setalphanummathfonts with corresponding arguments should be called.

4 Examples

\{
$\text{中文 in math 测 试}$
\usecustommathfonts
\Large $\text{能量} E = mc^2$, $s_\text{总} = \frac{1}{2} at^2$
\}

中文inmath测试 能量$E = mc^2$, $s_\text{总} = \frac{1}{2} at^2$