

# Relation Symbols

## A L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Package

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v 0.9999999999999̄ 05/08/2014

## 1 Installation

The program termination problem, also known as the uniform halting problem, can be defined as: *Using a finite amount of time: determine whether a given program will always finish running or could possibly execute forever.*

The Metafont programming and L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> package writing and T<sub>E</sub>Xmacro programming (*especially the T<sub>E</sub>Xmacro programming*) required to produce these symbols looked like it might, itself, never end. It took more than a year of work in fits and starts to understand how the jalousie of bits and pieces go together to make a font work with L<sup>A</sup>T<sub>E</sub>X. The Comprehensive L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> Symbol List (<http://www.ctan.org/tex-archive/info/symbols/comprehensive/>) does not currently include this set, but on completion all of these files will be ready to upload in the correct formats for inclusion. These are implemented as a standard T<sub>E</sub>X math symbol font, implemented with custom Metafont sources, rendered on-the-fly as needed by L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>. Also provided in this package is a PostScript Type 1 version of the font. Symbols are accessed through macros defined in this package.

Installation involves copying the supplied files to their designated places within L<sup>A</sup>T<sub>E</sub>X's search path and updating T<sub>E</sub>X's databases.

1. First, you need to find the folder `texmf-local` (on Unix the default is `/usr/local/texlive/texmf-local`). To do that, run:

```
kpsewhich --var-value TEXMFLOCAL
```

Subsequently, this directory will be referred to as `TEXMFLOCAL`.

2. Copy the files into the following directories, creating subdirectories as necessary:

- copy `esrelation.sty` and `uesrelation.fd` to:  
`TEXMFLOCAL/tex/latex/local/public/esrelation`
- copy `esrelation.mf` and `esrelation10.mf` to:  
`TEXMFLOCAL/fonts/source/local/public/esrelation`

If you also want to install the fonts in Type1 format:

- copy esrelation10.pfb to:  
TEXMFLOCAL/fonts/type1/local/public/esrelation
- copy esrelation10.tfm to:  
TEXMFLOCAL/fonts/tfm/local/public/esrelation
- copy esrelation.map to:  
TEXMFLOCAL/fonts/map/dvips/esrelation

Note that all created directories should be set to mode 755 and all files should be set to mode 644.

3. Update your L<sup>A</sup>T<sub>E</sub>X font database. This is called the ls-r and lives in a few places. Fortunately, you can just run this, likely as sudo or root (-H sets HOME for the sudo environment):

```
sudo -H mktexlsr
```

4. Update your T<sub>E</sub>X font map by running the command:

```
sudo -H updmap-sys --enable Map=esrelation.map
```

5. Update the font database again:

```
sudo -H mktexlsr
```

6. Open L<sup>A</sup>T<sub>E</sub>X, and start relating.

## 2 Using esrelation

Load the package with `\usepackage{esrelation}`. Available symbols to be used from math mode:

<code>\relationrightproject</code>	$\overrightarrow{ A, Z }$
<code>\relationleftproject</code>	$\overleftarrow{ A, Z }$
<code>\relationlifting</code>	$\overline{ A, Z }$
<code>\restrictwand</code>	$i_{\downarrow}$
<code>\restrictwandup</code>	$i_{\uparrow}$
<code>\restrictbarb</code>	$R_{\downarrow}$
<code>\restrictbarbup</code>	$R_{\uparrow}$
<code>\restrictmallet</code>	$Z_{\downarrow}$
<code>\restrictmalletup</code>	$Z_{\uparrow}$

$$\overrightarrow{R_A}$$

$$\overrightarrow{0,1}$$

$$\overleftarrow{0,1}$$

$$\lfloor 0,1$$

$$\overleftarrow{\overrightarrow{\overrightarrow{1,1}}}$$

$$\lfloor x\mathbf{x}>1,\ \mathbf{x}x=0$$

$$\lll x,X_{\downarrow}$$

$$\overleftarrow{\overrightarrow{\overrightarrow{\overrightarrow{i,R}}}}$$

$$X_{\downarrow}\,X_{\downarrow}^2\,X_{\downarrow}^{\infty}$$

$$X_{\downarrow}$$

$$X_{\downarrow}$$

End. Try some more combinations now that it's running.