

# The `mathastext` package

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## Abstract

The `mathastext` package<sup>1</sup> propagates the document *text* font to *mathematical* mode, for the letters and digits of the Latin alphabet and, optionally, some further characters. The idea is to produce handouts or research papers with a less book-like typography than what is typical of standard  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$  with the Computer Modern fonts. Hopefully, this will force the reader to concentrate more on the contents ;-). It also makes it possible (for a document with simple mathematics) to use a quite arbitrary font without worrying too much that it does not have specially designed accompanying math fonts. Also, `mathastext` provides a simple mechanism in order to use many different choices of (text hence, now, math) fonts in the same document (not that we recommend it!). A final aspect is that `mathastext` helps sometimes produce smaller PDF files.

Further documentation, and examples, are available here:  
<http://jf.burnol.free.fr/mathastext.html>

## 1 Description of what the package does

### 1.1 Motivation

`mathastext` was conceived as a result of frustration of distributing to students  $\mathrm{T}_{\mathrm{E}}\mathrm{X}$ -crafted mathematical handouts with a subsequent realization that not much had made it to a semi-permanent brain location. So, I forced  $\mathrm{L}^{\mathrm{A}}\mathrm{T}_{\mathrm{E}}\mathrm{X}$  to produce material as if written on a primitive typewriter, a little bit like the good old seminar notes of the Cartan and Grothendieck days. Don't ask me if this helped, I have long since opted for a positive attitude in life.

The package `mathastext` is less extreme, but retains the idea of using inside mathematics the same font as is used for text for the letters of the Latin alphabet and the digits:

abcdefghijklmnopqrstuvwxyz  
ABCDEFGHIJKLMNOPQRSTUVWXYZ  
0123456789

By default the text font will also be used for:

! ? \* , . : ; + - = ( ) [ ] / # \$ % & < > | { } and \

If the package detects at the time of being loaded that the default encoding is OT1, it takes out from the list  $\langle \rangle | \{ \}$  and  $\backslash$ . The option `alldelims` can force re-integration in case one uses a fixed-width OT1 font.

The commands `\mathnormal`, `\mathrm` and `\mathbf` are modified but nothing is changed to `\mathit` and the other math alphabet commands which will use the default math fonts, not the text font.

A very short list of further glyphs will be also picked up in or constructed from the text font: the dotless i and j, the hbar and the math accents. By default the en-dash – is used for the minus sign and not the hyphen character -. Version 1.11 brings a better compatibility with a Unicode setting (assuming that `fontspec` is made use of), but the scope of `mathastext` does not include directly input letters

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<sup>1</sup>This document describes `mathastext` version 1.11 (2011/02/06).

with diacritics é, à, ö in math mode. Users of XeTeX are advised to look at the much more sophisticated and encompassing **mathspec** package.

Even when typesetting simple mathematics, some glyphs may have to be taken from the default math fonts, for example the prime  $\prime$ .

## 1.2 The italic option

In the initial version 1.0, the package gave the same shape to both letters and digits, either the one given by `\shapedefault` at the time of loading the package, or another one specified by the user, and this was deliberate. This gives a very uniform look to the document, so that one has to make an effort and read it with attention, I explained above why I did this on purpose.

Nevertheless, soon after I posted the package to CTAN, I was overwhelmed by numerous<sup>2</sup> questions<sup>3</sup> on how to have the letters be in italic shape.

The version 1.1 provided precisely this feature. The default is still, as in version 1.0, for everything to be in upright shape, but it suffices to pass to the package the option **italic**. There is now also an option **frenchmath** to make the uppercase letters nevertheless upright, because this is the way of traditional French mathematical typography.

## 1.3 Greek letters

Regarding the Greek letters: the default (lowercase) ones from Computer Modern are slanted, hence, if the **italic** option just mentioned is not made use of, they will not mix well with upright letters (besides, the Computer Modern typefaces are very light in comparison to many text fonts). So there are options to take these glyphs either from the Euler font or from the Postscript Symbol font. Both are included in all L<sup>A</sup>T<sub>E</sub>X distributions. Although no package loading is necessary for the user, nor done internally by **mathastext**, the file `uzeur.fd` from the **eulervm** package must be accessible to L<sup>A</sup>T<sub>E</sub>X as it provides a mechanism to scale by an arbitrary factor the Euler font. For the Postscript Symbol font (which is included in the basic L<sup>A</sup>T<sub>E</sub>X distribution), **mathastext** does internally what is necessary, so that in both cases commands are provided so that the user can scale the font with respect to nominal size.

Of course, it is also possible to access upright Greek letters via loading first specific packages providing math fonts, for example the **fourier** package (with option ‘upright’). One just has to make sure to load **mathastext** as the last one of the font-related packages.

## 1.4 Math versions

L<sup>A</sup>T<sub>E</sub>X has two math versions (**normal** and **bold**): **mathastext** provides a straightforward mechanism to define many more. The encodings of the various **mathastext**-defined versions can be arbitrary; but as **mathastext** decides at the time when it is loaded where to look for things like the en-dash, or the dotless i and j, or the math accents, which are encoding-dependent, there are obviously some limitations to the

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<sup>2</sup>this means “more than one.”

<sup>3</sup>I thank in particular Tariq PERWEZ and Kevin KLEMENT for their kind remarks (chronological order).

use of these things in more than one math version. Here is an example of how this goes:

```
\usepackage[T1]{fontenc}
\usepackage{mathastext}
% Latin Modern Typewriter Proportional
\MTDeclareVersion{lmvtt}{T1}{lmvtt}{m}{n}
% Baskervald, letters in italics
\MTDeclareVersion[it]{baskervald}{T1}{ybv}{m}{n}
% Bold Helvetica, digits and operator names slanted
% and letters (in math mode only) upright
\MTDeclareVersion[n]{helvetica}{T1}{phv}{b}{sl}
\begin{document}
\MTVersion{helvetica}
Hello $world!$.
\MTVersion[lmvtt]{baskervald}
Here lmvtt but $here\ baskervald$.
\MTVersion{normal}
Default font when loading mathastext, $in\ math\ also$.
\end{document}
```

Other ways to achieve the same result:

```
\usepackage[T1]{fontenc}
\usepackage{mathastext}
\renewcommand{\rmdefault}{lmvtt}
\Mathastext[lmvtt]
\renewcommand{\rmdefault}{ybv}
\MTlettershape{it}
\Mathastext[baskervald]
\renewcommand{\shapedefault}{sl}
\renewcommand{\rmdefault}{phv}
\renewcommand{\mddefault}{b}
\MTlettershape{n}
\Mathastext[helvetica]
\begin{document}
\MTVersion{helvetica}
Hello $world!$.
\MTVersion[lmvtt]{baskervald}
Here lmvtt but $here\ baskervald$.
\MTVersion{normal}
Default font when loading mathastext, $in\ math\ also$.
\end{document}
```

Unicode encoded fonts can also be accomodated. Here is an example (a bit schizophrenic) for a Xe<sub>T</sub>E<sub>X</sub> or Lua<sub>A</sub>T<sub>E</sub>X user. Of course `mathastext`'s facilities are very meager to specify a math font, as basically they are quasi-limited to a subset of the 32-127 ascii range:<sup>4</sup> the much more powerful and sophisticated package `mathspec` is recommended to Xe<sub>T</sub>E<sub>X</sub> users.

```
\usepackage[no-math]{fontspec}
\setmainfont{comffortaa}
```

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<sup>4</sup>see the introduction describing the initial goals of this package.

```

\usepackage{mathastext} % the normal version uses Comfortaa
\setmainfont{TeX Gyre Pagella}
\Mathastext[pagella] % the pagella version uses Pagella
\MTDeclareVersion{times}{T1}{ptm}{m}{n}
    % this is a T1-times. Do not try to use this
    % command for a Unicode font, use rather the
    % \setmainfont command of |fontspec|,
    % followed by \Mathastext
\setmainfont{TeX Gyre Schola}
\Mathastext[schola] % and unicode TeX Gyre Schola
\begin{document}
\MTVersion{pagella}
This is in TeX Gyre Pagella $and\ this\ also$ (unicode font).
\MTVersion{times}
Now we are in URW Times, $here\ also$ (T1 encoded font).
\MTVersion[normal]{schola}
Text in Unicode Comfortaa and $math\ in\ Unicode\ Schola$.
\end{document}

```

For basic use one does not need to worry about the purely optional mechanism of math versions: to use the package, one only needs loading it (the default font at the time of loading the package will become the font used in mathematics). Users of XeTeX and LuaLaTeX will need to have loaded the package `fontspec`, *with option* `no-math`, and *before* `mathastext`.

## 1.5 Main options

`italic`, `frenchmath`: were described above (new in 1.1).

`symbolgreek`: the Greek letters will be taken from the Postscript Symbol font.

`eulergreek`: the Greek letters will be taken from the Euler font.

`symbolmax`: all characters other than letters and digits will be taken from the Symbol font. This option also makes a number of further glyphs available, including some basic mathematical arrows, as well as the sum and product signs. For documents with very simple needs in mathematical symbols, the options `symbolmax` (and another one called `alldelims`) may give in the end a quite smaller PDF file, as the Computer Modern fonts, or whatever mathematical fonts initially loaded by packages for use in the document, may well be avoided altogether.

`defaultmathsizes`: the package `mathastext` opts for quite big subscripts (and, copied from the `moresize` package, redefines `\Huge` and defines `\HUGE`). Use this option to prevent it from doing so.

## 1.6 Miscellaneous

**the en-dash as minus sign:** Very often the `-` character from the text font does not give a good minus sign. So by default, the package uses the en-dash sign `–`. In version 1.11 of the package this should work in all encodings, including Unicode (it is then assumed that `fontspec` has been loaded). It is

not necessary anymore to pass the option `endash`, rather there is `noendash` to deactivate it.

**hbar:** The definition of `\hbar` inherited from default  $\text{\LaTeX}$  will in our context make use of the `h` of the current math font (so for us, it is also the text font, perhaps in italic shape), but the bar accross the `h` will come from the original default math font for letters (usually `cmml`), and furthermore its placement on the `h` can be odd-looking. So we redefine `\hbar` to use only the text font (and this will be aware of the `italic` option). Our construction does not always give an optimal result (and is limited to OT1 and T1 encodings), so an option `nohbar` deactivates it. There is no `\hslash` provided by the package, though. With version 1.11 and a Unicode font the package tries to get the `\hbar` directly as a glyph from the font.

**dotless i and j:** By default the package redefines `\i` and `\j` to give the dotless `i` and `j` (if it exists at all), *also in math mode*, in the text font. Will overwrite the default commands `\imath` and `\jmath`. In version 1.11 of the package this should work in all encodings, including Unicode (it is then assumed that `fontspec` has been loaded, and of course that the glyphs are indeed in the font).

**vec accent:** The default `\vec` accent is not appropriate for upright letters, so `mathastext` provides a `\fouriervec` which takes its glyph in a Fourier font, and an Ersatz `\pmvec` which is reasonably good looking on upright letters and works with the `\rightarrow` glyph. Contrarily to version 1.0, the default `\vec` is not overwritten with `\fouriervec`. And contrarily to version 1.1, one now needs to pass the option `fouriervec` to have the math accent `\fouriervec` defined by the package.

**math alphabets:** The `\mathnormal`, `\mathrm`, and `\mathbf` are modified to use the text font (or the arbitrarily specified font for a math version), and behave as in standard  $\text{\LaTeX}$ . But we provide a new `\mathnormalbold`, to access the bold letters while maintaining their italic shape (or whatever shape has been specified for them) in case of the `italic` option. Other math alphabet changing commands are `\MathEulerBold`, `\MathEuler` and `\MathPSymbol`. Note though that it is not possible to use too many of such commands in the same document, due to some limitations of  $\text{\LaTeX}$ . Declaring them does not seem to be a problem, and I will welcome any information by knowledgeable people.

**math accents:** an option `mathaccents` is provided to pick up the accents in math mode from the text font, but this is only for either an OT1-compatible or a T1-encoded font.

Regarding the encoding-dependent glyphs: the en-dash, the dotless `i` and `j`, the math accents, the `hbar`, are encoding dependent and the relevant decisions are made by `mathastext` at the time it is loaded. So you can use math versions with different encodings but, regarding these characters only those with the same encoding as the normal math version will display them correctly.

## 2 Commands

### 2.1 Preamble-only commands

Nothing is necessary besides loading `mathastext`, possibly with some customizing options. The following commands provide enhancements to the basic use of the package.

- `\Mathastext`: reinitializes `mathastext` according to the current defaults of encoding, family, series and shape.
  - It can also be preceded optionally by one or more of<sup>5</sup> `\MTencoding{<enc>}`, `\MTfamily{<fam>}`, `\MTseries{<ser>}`, `\MTshape{<sh>}`, and, new with version 1.1, `\MTlettershape{<sh>}`. For example valid values are, respectively, `<T1>`, `<phv>`, `<m>`, `<n>`, and `<it>`: this is the Helvetica font in T1-encoding, regular (medium) series, upright shape, and the letters will be in italic shape.
  - with version 1.11 `\Mathastext` accepts an optional argument, which will serve as a name to designate the corresponding math version. Without optional argument `\Mathastext` redefines the default normal and bold versions. This argument, being optional, must be enclosed within square brackets.
- `\MTWillUse[<ltsh>]{<enc>}{<fam>}{<ser>}{<sh>}`: tells `mathastext` to use the font with the specified encoding, family, series, and shape for the letters and digits (and all other afflicted characters) in math mode. The optional argument `<ltsh>` specifies a shape for the letters, for example `\itdefault`, or directly `<it>` or `<sc>`.
- `\MTDeclareVersion[<ltsh>]{<name>}{<enc>}{<fam>}{<ser>}{<sh>}`: declares that the document will have access to the font with the specified characteristics, under the version name `<name>`. For example:  

```
\MTDeclareVersion[sc]{palatino}{T1}{ppl}{b}{sl}
```

declares under the name `palatino` a version where mathematics will be typeset using the Palatino font in T1-encoding, bold, slanted, and the letters will in fact be in caps and small caps (and bold).<sup>6</sup> When the optional argument is absent, and `mathastext` was loaded with the `italic` option, then the default letter shape will be `it`,<sup>7</sup> else letters will have the same shape as used for digits and operator-names.
- `\MTboldvariant{<var>}`: when used before `\Mathastext`, specifies which bold (`b`, `sb`, `bx`, ...) to be used by `\mathbf` (and `\boldmath`). Default is the `\bfdefault` at the time of loading `mathastext`. When used before the declaration of a version, decides the way `\mathbf` will act in this version.
- `\MTEulerScale{<factor>}`: scales the Euler font by `<factor>`.
- `\MTSymbolScale{<factor>}`: scales the Symbol font by `<factor>`.

<sup>5</sup>these commands exist also with long names: `\Mathastextencoding`, etc. . . The same applies to the other commands mentioned in this section.

<sup>6</sup>I do not especially recommend to use this in real life!

<sup>7</sup>more precisely, the shape is the latest value passed in one of the previously used package commands to specify the shape of letters, or the `\itdefault` of the time of loading the package.

## 2.2 Body Text and Math commands

- `\MTVersion[⟨nametext⟩]{⟨namemath⟩}`: in the absence of the optional argument changes simultaneously (the behavior changed in version 1.11) the text and the math font to be the font corresponding to the version `⟨namemath⟩`. If there is an optional argument then the text font will use `⟨nametext⟩` and the math mode will use `⟨namemath⟩`. To change only the math font, use the L<sup>A</sup>T<sub>E</sub>X command `\mathversion`.

All further commands are for math mode only.

- `\hbar`: this is constructed (in a way compatible with the `italic` option) from the `h` letter and the `ˉ` accent from the `mathastext` font. Note that `\mathrm{\hbar}` and `\mathbf{\hbar}` should work and that `\hbar` does scale in subscripts and exponents. Only for T1 and OT1 encodings.
- `\fouriervec`: this is a `\vec` accent taken from the Fourier font; the `fourier` package need not be loaded. Active only if option `fouriervec`.
- `\pmvec`: this provides a poor man `\vec` accent command, for upright letters. It uses the right arrow. Does not change size in subscripts and exponents.
- `\Mathnormal`, `\Mathrm`, `\Mathbf`: suitable modifications of the original `\mathnormal`, `\mathrm`, `\mathbf`. By default, the originals are also overwritten by the new commands.
- `\mathnormalbold`: a bold version of `\mathnormal`.
- `\inodot`, `\jnodot`: the corresponding glyphs in the chosen font for math mode. By default, will overwrite `\imath` and `\jmath`. With version 1.11 by default `\i` and `\j` work also in math mode and give then `\inodot`, resp. `\jnodot`. This should work for all 8bit-encodings having these glyphs, and also in Unicode.
- `\MathEuler`, `\MathEulerBold`: math alphabets to access all the glyphs of the Euler font, if option `eulergreek` (or `eulerdigits`) was passed to the package.
- `\MathPSymbol`: math alphabet to access the Symbol font.
- Capital Greek letters: macro names `\Digamma`, `\Alpha`, `\Beta`, `\Epsilon`, `\Zeta`, `\Eta`, `\Iota`, `\Kappa`, `\Mu`, `\Nu`, `\Omicron`, `\Rho`, `\Tau`, `\Chi` are provided for the capital Greek letters which look like their Latin counterparts. This is not done if the package detects that `\digamma` is a defined macro, as then it is assumed that a suitable package has been loaded for Greek letters. Also an `\omicron` control sequence is provided.
- Miscellaneous mathematical symbols from the postscript Symbol font are made available (or replaced) when option `symbolmisc` is passed. They are `\prod`  $\prod$  `\sum`  $\sum$  `\implies`  $\Rightarrow$  `\impliedby`  $\Leftarrow$  `\iff`  $\iff$  `\shortiff`  $\Leftrightarrow$  `\to`  $\rightarrow$  `\longto`  $\longrightarrow$  `\mapsto`  $\mapsto$  `\longmapsto`  $\longmapsto$  `\aleph`  $\aleph$  `\infty`  $\infty$  `\emptyset`  $\emptyset$  `\surd`  $\sqrt{\phantom{x}}$  `\nabla`  $\nabla$  `\angle`  $\angle$  `\forall`  $\forall$  `\exists`  $\exists$  `\neg`  $\neg$  `\clubsuit`  $\clubsuit$  `\diamondsuit`  $\diamondsuit$  `\heartsuit`  $\heartsuit$  `\spadesuit`  $\spadesuit$  `\smallint`  $\int$  `\wedge`  $\wedge$  `\vee`  $\vee$  `\cap`  $\cap$  `\cup`  $\cup$  `\bullet`  $\bullet$  `\div`  $\div$  `\otimes`  $\otimes$  `\oplus`  $\oplus$

$\pm$ ,  $\ast$ ,  $\times$ ,  $\propto$ ,  $\mid$ ,  $\leq$ ,  $\geq$ ,  $\approx$ ,  $\supset$ ,  $\subset$ ,  $\supseteq$ ,  $\subseteq$ ,  $\in$ ,  $\sim$ ,  $\cong$ ,  $\perp$ ,  $\equiv$ ,  $\notin$ ,  $\angle$ ,  $\langle$ ,  $\rangle$ . And a `\DotTriangle`  $\therefore$  is made available by option `symbolre` (which overwrites `\Re` and `\Im`:  $\Re, \Im$ ).

### 3 Complete list of options

- **basic**: only `mathastextify` letters and digits.
- **italic**: the letters will default to italic shape in math mode.
- **frenchmath**: uppercase Latin letters in the same font as for digits and operator names. In general this means that they will be upright.
- **endash**, **emdash**: use the text font en-dash – or even the em-dash — (but this seems crazy) for the minus sign rather than -. **endash** option is default for the package.
- **noendash**: the minus sign will be the - from the text font, not the en-dash –.
- **nohbar**: prevents `mathastext` from defining its own `\hbar`.
- **nolessnomore**: besides `! ? * , . : ; + - = ( ) [ ] / # $ % &` `mathastext` treats also `< > | { }` and `\`. Use this option to not do it. The option **nolessnomore** is activated by default in case of OT1-encoding.
- further excluding options: **noexclam** `! ?` **noasterisk** `*` **nopunct** `, . : ;` **noplus**, **nominus**, **noplusnominus** `+ -` **noequal** `=` **noparenthesis** `( ) [ ]` **nospecials** `# $ % &` and **nodigits**.
- **alldelims**: true by default, means that the characters excluded by **nolessnomore** are treated. Use this option in case of a mono-width OT1-encoded font.
- **symbolgreek**, **symboldigits**: to let Greek letters (digits) use the Symbol font.
- **symbolre**: replaces `\Re` and `\Im` by the Symbol glyphs  $\Re, \Im$  and defines a `\DotTriangle` command ( $\therefore$ ).
- **symbolmisc**: takes quite a few glyphs, including logical arrows, product and sum signs from Symbol. They are listed *supra*.. You may also consider `\renewcommand{\int}{\smallint}` to maximize still more the use of the Symbol font.
- **symboldelimiters**: the characters apart from letters and digits will be taken from the Symbol font.
- **symbol**: combines **symbolgreek**, **symbolre**, and **symbolmisc**.
- **symbolmax**: combines **symbol** and **symboldelimiters**.
- **eulergreek**, **eulerdigits**: to let Greek letters (digits) use the Euler font.
- **selfGreek**: this is for a font which has the capital Greek letters at the OT1 slot positions.



- **mathaccents:** use the text font also for the math accents. As in vanilla  $\text{\LaTeX}$ , they are taken from the font for the digits and  $\text{\log}$ -like names. Obey the alphabet changing commands. Will work only for T1 or OT1-compatible encodings.
- **defaultterm, defaultbf, defaultnormal:** do not overwrite the default  $\text{\mathrm}$ ,  $\text{\mathbf}$ ,  $\text{\mathnormal}$ .
- **defaultmath:** do not overwrite  $\text{\imath}$  and  $\text{\jmath}$ , do not extend  $\text{\i}$  and  $\text{\j}$  to math mode use.
- **defaultmathsizes:** do not change the  $\text{\LaTeX}$  defaults.
- **fouriervec:** provides a  $\text{\fouriervec}$  command.