

# 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  $\text{\TeX}$  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  $\text{\TeX}$ -crafted mathematical handouts with a subsequent realization that not much had made it to a semi-permanent brain location. So, I forced  $\text{\LaTeX}$  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. By default the text font will also be used for:

`! ? * , . : ; + - = ( ) [ ] / # $ % &`

and with the option `alldelims` also for:

`< > | { } and \`

Introducing this option was made necessary by the absence of these characters in OT1-encoded fonts (except for mono-width fonts). It is suitable for most other text font encodings, such as T1.

### 1.2 Letters and digits

In the initial version 1.0, we had the same shape both for 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.

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<sup>1</sup>This document describes `mathastext` version 1.1 (2011/02/01).

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 new version 1.1 provides 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 was not made use of, they will not mix well with upright letters (also 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. Once declared in the preamble, these versions can now be activated by a package provided command which adds to the default `\mathversion` an optional argument which will result in changing the text font. In the spirit of the package the mandatory and optional arguments should be identical, but the user can make an arbitrary specification. For example this allows to use some font in medium series for the text and at the same time the same font in semi-bold series for the mathematics. Also the encoding 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 use of these things in more than one math version.

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), with some options. We describe a few here, the complete list is given in a later section.

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

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

## 1.5 Main options

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

`endash`: the minus sign is represented in mathematics mode by the en-dash glyph from the text font (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 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 across the `h` will come from the original default math font for letters (usually `cmi`), 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, so an option `nohbar` deactivates it (many font-related packages like `amsmath` have their own `\hbar`, but in the spirit of minimizing font requirements, I felt compelled to try to do something). There is no `\hslash` provided by the package, though.

The default `\vec` accent is not appropriate for upright letters, so the `mathastext` provides a `\fouriervec` which takes its glyph in a Fourier font, and an Ersatz `\pmvec` is provided 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`.

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.

## 2 Commands provided by the package

### 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 `\Mathastextencoding{⟨enc⟩}`, `\Mathastextfamily{⟨fam⟩}`, `\Mathastextseries{⟨ser⟩}`, `\Mathastextshape{⟨sh⟩}`, and, new with version 1.1, `\Mathastextlettershape{⟨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.
- `\MathastextWillUse[⟨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⟩`.
- `\MathastextDeclareVersion[⟨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:  
`\MathastextDeclareVersion[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>4</sup> When the optional argument is absent, and `mathastext` was loaded with the `italic` option, then the default letter shape will be `it`,<sup>5</sup> else letters will have the same shape as used for digits and operator-names.
- `\Mathastextboldvariant{⟨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.
- `\MathastextEulerScale{⟨factor⟩}`: scales the Euler font by `⟨factor⟩`.
- `\MathastextSymbolScale{⟨factor⟩}`: scales the Symbol font by `⟨factor⟩`.

### 2.2 Body Text and Math commands

- `\MathastextVersion[⟨nametext⟩]{⟨namemath⟩}`: changes the math font, and optionally also the text font. This is to be used like the  $\text{\LaTeX 2}_{\epsilon}$  command `\mathversion`, outside of mathematics mode. If no optional argument is given then is equivalent to `\mathversion{⟨nameversion⟩}`.

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<sup>4</sup>I do not especially recommend to use this in real life!

<sup>5</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.

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 (as the package only really knows about OT1 and T1 encodings, `\hbar` might not be correct in other encodings). Note that `\mathrm{\hbar}` and `\mathbf{\hbar}` should work and that `\hbar` does scale in subscripts and exponents.
- `\fouriervec`: this is a `\vec` accent taken from the Fourier font; the `fourier` package need not be loaded.
- `\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. By default, will overwrite `\imath` and `\jmath`.
- `\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 are made available (or replaced) when option `symbolmisc` is passed. They are `\prod`, `\sum`, `\implies`, `\impliedby`, `\iff`, `\shortiff`, `\to`, `\longto`, `\mapsto`, `\longmapsto`, `\aleph`, `\infty`, `\emptyset`, `\surd`, `\nabla`, `\angle`, `\forall`, `\exists`, `\neg`, `\clubsuit`, `\diamondsuit`, `\heartsuit`, `\spadesuit`, `\smallint`, `\wedge`, `\vee`, `\cap`, `\cup`, `\bullet`, `\div`, `\otimes`, `\oplus`, `\pm`, `\ast`, `\times`, `\propto`, `\mid`, `\leq`, `\geq`, `\approx`, `\supset`, `\subset`, `\supseteq`, `\subseteq`, `\in`, `\sim`, `\cong`, `\perp`, `\equiv`, `\notin`, `\langle`, `\rangle`. And a `\DotTriangle` is made available by option `symbolre` (which also overwrites `\Re` and `\Im`.)

### 3 Complete list of options

- `basic`: only `mathastext` 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 -.
- **nohbar**: prevents **mathastext** from defining its own `\hbar`.
- **alldelims**: besides the default `! ? * , . : ; + - = ( ) [ ] / # $ % &` treat also `< > | { }` and `\`. Not suitable for OT1-encoding.
- excluding options: **noexclam** `! ?` **noasterisk** `*` **nopunct** `, . : ;` **noplus**, **nominus**, **noplusnominus** `+ -` **noequal** `=` **noparenthesis** `( ) [ ] /` **nospecials** `# $ % &` and **nodigits**.
- **symbolgreek**, **symboldigits**: to let Greek letters (digits) use the Symbol font.
- **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 L<sup>A</sup>T<sub>E</sub>X, they are taken from the font for the digits and `\log`-like names. Obey the alphabet changing commands. Will work only for T1 or OT1-compatible encodings.
- **symbolre**: replaces `\Re` and `\Im` by Symbol glyphs and defines a `\DotTriangle` command.
- **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.
- **symbol**: combines **symbolgreek**, **symbolre**, and **symbolmisc**.
- **symbolmax**: same as **symbol** and furthermore the characters listed above are also taken from the Symbol font.
- **defaultrm**, **defaultbf**, **defaultnormal**, **defaultimath**: self-explanatory.
- **defaultmathsizes**: has been described *supra*.