The mathastext package

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Abstract

The **mathastext** package[1] propagates the document *text* font to *mathematical* mode, for the letters of the Latin alphabet and, optionally, some further ASCII-127 characters. The idea is to produce handouts or research papers with a less book-like typography than what is typical of standard 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 produce smaller PDF files.

1 Introduction

This document has `\usepackage{mathastext}` (with some options described later) in its preamble. Let us now typeset some mathematics.

We define the quantities $X = X(\nu, n, a)$ and $Y(\nu, n, a)$ by the following expressions:

$$X := \frac{g_{\nu+1}}{h_{\nu+1}} = \frac{1}{a}\frac{e_\nu}{f_\nu}\,, \tag{1}$$

$$Y := -\frac{1}{a}\frac{c_n^{\nu+1}}{d_n^{\nu+1}} = -\frac{c_1^\nu}{d_1^\nu}\,. \tag{2}$$

From Proposition 2.7.1 we have $\mu_\nu = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-ah_{\nu+1}c_1^\nu + g_{\nu+1}d_1^\nu\right)$ and using the first two relations in Proposition 5.9.5 gives:

$$\mu_\nu = \frac{2na}{1-a^2}\,\frac{-h_{\nu+1}c_n^{\nu+1} + g_{\nu+1}d_n^{\nu+1}}{h_{\nu+1}d_n^{\nu+1} - g_{\nu+1}c_n^{\nu+1}} = \frac{2na}{1-a^2}\,\frac{X+aY}{1+aXY}\,. \tag{3}$$

[1] This documentation describes **mathastext** version 1.0 and was last revised on 2011/01/25.

The text font of the present document is the variable-width typewriter face from Latin Modern (in its "light" variant): the same font is used in mathematical mode for the Latin letters, so that the distinction between the text and the equations is blurred out. This will shock some, but as a mathematician I consider the text itself to be also an equation. So, I never quite adhered to all this business of using oblique or italic letters in inline or displayed mathematics.[2]

The option `eulergreek` was passed to `mathastext` to use the Euler font from the A.M.S. There is a similar option `symbolgreek` to use the Postscript Symbol font (included in the core LaTeX2e distribution) to typeset the Greek letters. Both are upright. If no option is passed the Greek letters will be in the mathematical "letters" font (by default Computer Modern), and they will be slanted,[3] which typically is not suitable for documents using `mathastext` (they will also generally look very thin comparatively to the text font).

Another thing to point out is that the subscript sizes have been dramatically increased, so that the text looks almost as if it had been written on a typewriter (an extremist user would use the LaTeX command `\DeclareMathSizes` to let subscripts have the same size as the main text font, we chose a middle-ground between this extreme and the default of LaTeX). The option `defaultmathsizes` tells the package not to apply any changes to the LaTeX defaults.

The package provides a simple mechanism, using the LaTeX "math versions", to change the design of the mathematics in the same document.[4] For example, we made in the preamble the declaration:

```
\MathastextDeclareVersion{lmvttmedium}{T1}{lmvtt}{sb}{n}
```

If we now issue the command `\MathastextVersion{lmvttmedium}` the looks of mathematics change:

> Similarly from 8.2.8 and 1.8.2, $\mu_{\nu+1} = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-h_{\nu+1}c_1^\nu + ag_{\nu+1}d_1^\nu\right)$ which gives using Proposition 3.1.4 and Definition 1.5.9:
>
> $$\mu_{\nu+1} = \frac{2na}{1-a^2}\frac{aX+Y}{1+aXY}\,. \tag{4}$$

Let us try the more radical `\MathastextVersion[utopia]{utopia}`. The "utopia" math version was defined in the preamble via

```
\MathastextDeclareVersion{utopia}{T1}{put}{m}{n}
```

> Similarly from 8.2.8 and 1.8.2, $\mu_{\nu+1} = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-h_{\nu+1}c_1^\nu + ag_{\nu+1}d_1^\nu\right)$ which gives using Proposition 3.1.4 and Definition 1.5.9:
>
> $$\mu_{\nu+1} = \frac{2na}{1-a^2}\frac{aX+Y}{1+aXY}\,. \tag{5}$$

[2] originally, **everything** was oblique, as mathematics was handwritten. Why should we use upright letters to say "group" and oblique letters for an element g of the group G? admittedly in French mathematical typography capital Roman letters are upright, but I want also the lowercase to follow suit.

[3] but see the mention of the **fourier** package *infra*.

[4] the present document also illustrates how quickly one gets a headache if one tries to read a document with multiple font changes...

The optional argument to `\MathastextVersion` tells it to change also the text font. While we are at considering the Utopia font, let us mention that it would have been better however to use the `fourier` package[5], which has an upright Greek alphabet which would look better here in combination with the utopia font than the Euler font. So, there is also the possibility to put in the preamble:

```
\usepackage[upright]{fourier}
\usepackage{mathastext}
```

in order to gain access to the Greek letters via the `fourier` package. If we now want to keep `utopia` as text font and foolishly typeset our mathematics in Avant Garde, we certainly can using `\MathastextVersion{avant}`:

Similarly from 8.2.8 and 1.8.2, $\mu_{\nu+1} = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-h_{\nu+1}c_1^\nu + ag_{\nu+1}d_1^\nu\right)$ which gives using Proposition 3.1.4 and Definition 1.5.9:

$$\mu_{\nu+1} = \frac{2na}{1-a^2}\frac{aX+Y}{1+aXY}\,. \tag{6}$$

Why stop here? we issue a `\MathastextVersion[courier]{avant}`:

Similarly from 8.2.8 and 1.8.2, $\mu_{\nu+1} = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-h_{\nu+1}c_1^\nu + ag_{\nu+1}d_1^\nu\right)$ which gives using Proposition 3.1.4 and Definition 1.5.9:

$$\mu_{\nu+1} = \frac{2na}{1-a^2}\frac{aX+Y}{1+aXY}\,. \tag{7}$$

We note that the Greek letters from the Euler font look a bit small compared to Avant Garde letters. The command

```
\MathastextEulerScale{1.1}
```

in the preamble would have scaled the Euler font to be 10% larger than its nominal size. This is a preamble-only command and we didn't use it here as we started with the Latin Modern font `lmvtt`.[6] The `mathastext` package loads the Euler font via the `uzeur.fd` font definition file from the `eulervm` package[7] and this makes a scaling mechanism available (the package is not loaded but the file `uzeur.fd` must be accessible to LaTeX). A similar command `\MathastextSymbolScale` is also provided (no specific package needed). The Euler font has the advantage compared to Symbol to have a bold version: $\boldsymbol{\alpha\beta\gamma}$.

```
\MathastextVersion[charter]{lmvttmedium}
```

Similarly from 8.2.8 and 1.8.2, $\mu_{\nu+1} = \frac{2a^{\frac{1}{2}}}{1-a^2}\left(-h_{\nu+1}c_1^\nu + ag_{\nu+1}d_1^\nu\right)$ which gives using Proposition 3.1.4 and Definition 1.5.9:

$$\mu_{\nu+1} = \frac{2na}{1-a^2}\frac{aX+Y}{1+aXY}\,. \tag{8}$$

[5] of Michel Bovani.

[6] It is in fact **lmvtt** itself that we have scaled to 112% of nominal size. **mathastext** provides no command for this, one has to include in the preamble a suitably modified **t1lmvtt.fd** file, on the model of what one sees for example in **t1phv.fd** from the LaTeX2e core package **psnfss**.

[7] of Walter Schmidt.

The package **mathastext** can be loaded with the option **basic**. The **basic** option tells the package to limit its scope to the Latin letters and to the digits. Without this option the default is to treat also the characters:

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

Due to their non-availability in the OT1-encoding (apart from typewriter fonts), the characters < > | { } and \ need to be specifically requested via the option **alldelims**. In the present document we used the option **symbolmax** so that in fact the characters listed above (apart from # $ % & and \) are typeset in mathematical mode using the Symbol font:

math: ! ? ∗ , . : ; + − = ( ) [ ] / # $ % & < > | { } \

Besides the option **basic** which cancels consideration of all these characters, various subsets can be excluded, via the options **noequal**, **noplusnominus**, **noexclam**, **nospecials**, **nodigits**, **noparenthesis**, **nopunctuation**, **noasterisk**.

Regarding the Greek letters, we already mentioned **symbolgreek** and **eulergreek**, and there is also **selfGreek** which is provided for OT1-fonts which have the capital Greek letters.

Other self-explanatory options are **symboldigits** and **eulerdigits**.

The option **mathaccents** tells **mathastext** to also pick up the mathematical accents from the text font; the package makes a choice between OT1 and T1 slot positions: if not all fonts declared to **mathastext** are OT1-encoded, then the T1-positions are assumed. A similar approach is taken for **\imath** and **\jmath** (commands **\inodot** and **\jnodot** are defined to use the text font, and the identification with **\imath** and **\jmath** can be prevented via the option **\defaultimath**).

There is also the issue of the **\vec** accent. As it looks awful on upright letters (its arrowhead is slanted, and it is shifted to the right), the default is to take the glyph from the mathematical font provided by the **fourier** package: $\vec{\imath}, \vec{\jmath}, \vec{k}$ (it is not needed to load the **fourier** package for this). The option **defaultvec** tells **mathastext** not to overwrite the standard **\vec**. Furthermore the package always makes available a "poor man"'s **\pmvec**: $\vec{\imath}, \vec{\jmath}, \vec{k}$.

The option **symbolre** gives access to the three symbols \Re ℜ, \Im ℑ, \DotTriangle ∴, and the option **symbolmisc** to the following list:

\prod ∏ \sum ∑ \implies ⇒ \impliedby ⇐ \iff ⟺ \shortiff ⇔
\to → \longto ⟶ \mapsto ↦ \longmapsto ⟼ \aleph ℵ \inftypsy ∞
\emptyset ∅ \surd √ \nabla ∇ \angle ∠ \forall ∀ \exists ∃ \neg ¬
\clubsuit ♣ \diamondsuit ♦ \heartsuit ♥ \spadesuit ♠ \smallint ∫
\wedge ∧ \vee ∨ \cap ∩ \cup ∪ \bullet • \div ÷ \otimes ⊗ \oplus ⊕
\pm ± \ast ∗ \times × \proptopsy ∝ \mid | \leq ≤ \geq ≥ \approx ≈
\supset ⊃ \subset ⊂ \supseteq ⊇ \subseteq ⊆ \in ∈ \sim ~ \cong ≅
\perp ⊥ \equiv ≡ \notin ∉ \langle ⟨ \rangle ⟩

The idea of the **symbolmisc** option (together with **alldelims**) is to (perhaps) reduce for documents with simple mathematics the number of fonts used. The ∞ symbol is small (presumably as it is designed already at script-size) compared to the default ∞, so we gave it another name and there is the possibility to do **\renewcommand{\infty}{\inftypsy}**.[8]

\MathastextVersion[lmvtt]{normal}

[8] The user can also give a try to **\renewcommand{\int}{\smallint}**.

2 Usage

2.1 Basic

One adds `\usepackage{mathastext}` after the other font-related `\usepackage`: this will set up the Latin letters and digits (and further characters, as described *supra*) to be typeset with the document text font also in mathematical mode. The command `\Mathastext` can be issued anywhere in the preamble to reinitialize `mathsastext` if the `\encodingdefault`, `\familydefault`, `\seriesdefault`, or `\shapedefault` has been changed. Alternatively one can use:

`\MathastextWillUse{<enc>}{<fam>}{<ser>}{<sh>}`

It is also possible to use one or more of the commands `\Mathastextencoding{<enc>}`, `\Mathastextfamily{<fam>}`, `\Mathastextseries{<ser>}`, `\Mathastextshape{<sh>}`, followed by a mandatory `\Mathastext` command (which has no argument).

The command `\Mathastextboldvariant{<var>}` specifies the series (b,bx,sb, etc...) to be used by `\mathbf`, and after `\boldmath`.

2.2 Using math versions

LaTeX has two mathematical versions: `normal` and `bold`. The command

`\MathastextDeclareVersion{}{}{}{}`

allows to declare arbitrarily many (well in practice not more than a dozen or so distinct) `versions`. As an example, let us reproduce here the declarations from this document:

```
\MathastextDeclareVersion{lmvtt}{T1}{lmvtt}{m}{n}
\MathastextDeclareVersion{lmvttmedium}{T1}{lmvtt}{sb}{n}
\MathastextDeclareVersion{times}{T1}{ptm}{m}{n}
\MathastextDeclareVersion{palatino}{T1}{ppl}{m}{n}
\MathastextDeclareVersion{bookman}{T1}{pbk}{m}{n}
\MathastextDeclareVersion{charter}{T1}{bch}{m}{n}
\MathastextDeclareVersion{newcent}{T1}{pnc}{m}{n}
\MathastextDeclareVersion{utopia}{T1}{futs}{m}{n}
\MathastextDeclareVersion{helvetica}{T1}{phv}{m}{n}
\MathastextDeclareVersion{avant}{T1}{pag}{m}{n}
\MathastextDeclareVersion{courier}{T1}{pcr}{m}{n}
```

These commands have to be issued in the preamble of the document. Then in the body of the document one uses the standard LaTeX command `\mathversion{}`. For example after `\mathversion{bookman}`, the Bookman font will be used for letters and digits in mathematics.[9]

Alternatively one can use `\MathastextVersion{bookman}` which is exactly the same thing, except that it allows an optional argument which enforces also a change of the text font. This has been described above.

[9] This mechanism is mainly provided to allow some context dependent design changes, for example for the statements of theorems or definitions.

2.3 Package options

basic: only letters and digits. The default is to also change the font for ! ? * , . : ; + - = ( ) [ ] / # $ % &. Various options exclude some subsets: **noexclam** ! ? **noasterisk** * **nopunct** , . : ; **noplusnominus** + - **noequal** = **noparenthesis** ( ) [ ] / **nospecials** # $ % & and **nodigits**. The **alldelims** option (not suitable for OT1-encoding) adds the characters < > | { } \ to the default list.

symbolgreek, **symboldigits**: to let Greek letters (digits) use the Symbol font. **eulergreek**, **eulerdigits**: to let Greek letters (digits) use the Euler font.

mathaccents: accents á à ä ã ā ă ǎ â ȧ å will use the text font.

symbolre and **symbolmisc** instruct to use the Symbol font for some miscellaneous symbols (described *supra*). The option **symbol** combines **symbolre**, **symbolgreek** and **symbolmisc**. The option **symbolmax** extends **symbol** as it will also typeset all characters described above (others than letters and digits) in the Symbol font (except the specials # $ % & and the backslash \).

The package defines commands **\Mathnormal**, **\Mathrm**, and **\Mathbf**, and it will overwrite **\mathnormal**, **\mathrm**, **\mathbf** except if the options **defaultnormal**, **defaultrm**, or **defaultbf** are passed. The package defines **\inodot** and **\jnodot**[10] and it will overwrite **\imath** and **\jmath** except if option **defaultimath** is passed.

The remaining options **selfGreek** (only suitable for OT1-encoded fonts), **defaultvec**, and **defaultmathsizes** have been described before.

All the options passed to the package apply globally to all math versions (if any) declared by **\MathastextDeclareVersion**. The commands (only for the preamble) **\MathastextSymbolScale{<x>}** and **\MathastextEulerScale{<x>}** will scale the respective fonts by factor <x>.

We used

\usepackage[alldelims,symbolmax,eulergreek,mathaccents]{mathastext}

in the preamble of the TEX source of this file.

[10] but the ȷ glyph is often unavailable in non-TEX fonts.