My humble additions to (La)TeX mathematics

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Abstract

This package provides a set of big delimiters, intermediate to those of the original TeX, and also much bigger. It also provides very wide accents (including two new ones: parenthesis and triangle). These symbols are included in a font provided both in Metafont and PostScript which has Don's `cmex10` as lower ASCII part.

1 Installation

This package consists of (a) a font, written in PostScript, (b) the same font written in Metafont, (c) a LaTeX style file, (d) a FD file for the OMX encoding using the new font.

If you are using PostScript fonts, just place the font file `yhcmex.pfa` wherever your dvi-to-PostScript driver can find it and add the necessary line in its configuration file so that it knows that the TeX font `yrcmex10` is rendered by the PostScript font called `Yhcmex` whose code is contained in the file `yhcmex.pfa`.

For example, for dvips, the following line should be placed into the `psfonts.map` file (or some file being read after the standard `psfonts.map` file:

```
yrcmex10 Yhcmex <yhcmex.pfa
```

As Metafont will not be launched if you use PostScript fonts, you need to place the TFM and VF files `yrcmex10.tfm`, `yhcmex10.tfm` and `yhcmex10.vf` in directories where TeX & friend can find them.

If for any reason you prefer Metafont to PostScript then read the following paragraph:

To build the font put all the Metafont files somewhere where your Metafont can find them (for example in texmf/fonts/src/public/yhmath). Then launch Metafont at least once on `yhcmex10` so that at least one TFM file exists when you'll start typesetting (`dvips` and similar programs will create the PKs, don't worry).

Finally, take the `OMXyhex.fd` file and put it together with your other FD (Font Definition) files; and `yhmath.sty` together with your other LaTeX styles. Have fun!

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2 Availability

Don Knuth's code is included in Metafont files, so this code is under the usual TeXware ©opyright conditions. My code is postcard-ware (if you like it and find it is worth a postcard + a stamp + the mental effort of writing a word [optional!] and the physical effort of going to the nearest mailbox, then do it!).

Everything is on CTAN, and if there are upgrades you will be informed in the usual way.

3 Very big delimiters

I never liked those parentheses of matrices which become almost immediately straight. In traditional math typography, parentheses stay curved, even if they are very big. So I decided to play around with TeX's `charlist` font property, and make some more of those big delimiters. I also did intermediate sizes (for all "big" delimiters). Here are some examples :

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} \begin{pmatrix} a & b & c \\ d & e & f \\ g & h & i \end{pmatrix} \begin{pmatrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \\ m & n & o & p \end{pmatrix} \tag{1}$$

$$\begin{pmatrix} a & b & c & d & e \\ f & g & h & i & j \\ k & l & m & n & o \\ p & q & r & s & t \\ u & v & w & x & y \end{pmatrix} \begin{pmatrix} a & b & c & d & e & f \\ g & h & i & j & k & l \\ m & n & o & p & q & r \\ s & t & u & v & w & x \\ y & z & \alpha & \beta & \gamma & \delta \end{pmatrix} \tag{2}$$

4 A new $\mathcal{AMS}$-LaTeX-like matrice-like environnement

Since I did also "very big" versions of the "left angle" and "right angle" symbols, why not making "matrices" with them as delimiters? I have never seen such a mathematical object, but perhaps was it just because this constructions wasn't available yet? (this is a chicken and egg story).

`amatrix` I called this new $\mathcal{AMS}$-LaTeX-like environment `amatrix` ("a" for "angle"). I hope AMS people will just love it and include it into $\mathcal{AMS}$-LaTeX![1]

Here are the same matrices as above, with angles instead of parentheses:

[1]Talking of $\mathcal{AMS}$-LaTeX there are a few more macros I would like to see included, see next section.

$$\left\langle\begin{matrix} a & b \\ c & d \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c \\ d & e & f \\ g & h & i \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c & d \\ e & f & g & h \\ i & j & k & l \\ m & n & o & p \end{matrix}\right\rangle \tag{3}$$

$$\left\langle\begin{matrix} a & b & c & d & e \\ f & g & h & i & j \\ k & l & m & n & o \\ p & q & r & s & t \\ u & v & w & x & y \end{matrix}\right\rangle \left\langle\begin{matrix} a & b & c & d & e & f \\ g & h & i & j & k & l \\ m & n & o & p & q & r \\ s & t & u & v & w & x \\ y & z & \alpha & \beta & \gamma & \delta \end{matrix}\right\rangle \tag{4}$$

5 New roots

Roots got bigger as well, so that now the "vertical root" comes much later. Example :

$$\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{\sqrt{x}}}}}}}}}}}}}$$

6 A few things missing from $\mathcal{AMS}$-LaTeX v1.2

`\adots` In $\mathcal{AMS}$-LaTeX there is a `\ddots` command for diagonal dots. How about antidiagonal ones? There are matrices called anti-symmetric, and for them we need the notation "dots going up". I define a `\adots` macro, with a code symetric to `\ddots`, here is the result: $\cdot^{\cdot^{\cdot}}$.

`\ring` Another thing missing in all TeX & Co. packages: the ring accent, used in topology for the interior of a space. I define a macro `\ring` to be used in math mode. Here is the result: if $X = [0, 1]$ then $\mathring{X} =]0, 1[$.

7 Very wide accents

`\widetriangle` `\wideparen` I added some more hats and tildes, so that you can get really wide accents now; see the examples below:

$$\widehat{A}, \widehat{AB}, \widehat{ABC}, \widehat{ABCD}, \widehat{ABCDE}, \widehat{ABCDEF}, \widehat{ABCDEFG}$$

$$\widetilde{A}, \widetilde{AB}, \widetilde{ABC}, \widetilde{ABCD}, \widetilde{ABCDE}, \widetilde{ABCDEF}, \widetilde{ABCDEFG}$$

I also designed two new accents: the triangle accent `\widetriangle` and the parenthesis accent `\wideparen`:

$$\widetriangle{A}, \widetriangle{AB}, \widetriangle{ABC}, \widetriangle{ABCD}, \widetriangle{ABCDE}, \widetriangle{ABCDEF}, \widetriangle{ABCDEFG}$$

$$\wideparen{A}, \wideparen{AB}, \wideparen{ABC}, \wideparen{ABCD}, \wideparen{ABCDE}, \wideparen{ABCDEF}, \wideparen{ABCDEFG}$$

The former is used (in France only??) to show that the notation ABC, where A, B, C are three points, means a triangle and not an angle. See what I mean? $\widetriangle{ABC}$ is a triangle, $\wideparen{ABC}$ is an angle.

The latter is used when we want a non-expansible accent to be applied to more than one letters at once. Of course $\mathcal{A}\!\mathcal{M}\!\mathcal{S}$-LaTeX has given a solution to this (place the symbols between parentheses and the accent as an exponent of the right parenthesis), by I happen not to like that solution. For example if I want to write "the interior of $[0, 1]$" I prefer to see

$$\widering{[0,1]}$$

than

$$([0,1])^{\circ}$$

don't you?

And of course this notation is not my invention, I saw it in many French math books (ever heard of Nick Bourbaki?).

`\widering` I call this macro `\widering`, because it plays the rôle of a wide symbol (and since the ring can't be widened, a parenthesis is used). Here are some more examples (the first one coded as `\ring{A}`):

$$\mathring{A}, \widering{AB}, \widering{ABC}, \widering{ABCD}, \widering{ABCDE}, \widering{ABCDEF}, \widering{ABCDEFG},$$

8 The code

⟨*package⟩

We require that the `amsmath` package is loaded:

```
\RequirePackage{amsmath}
```

First of all we have to ask LaTeX to use our brand new font for "large symbols"

```
\DeclareSymbolFont{largesymbols}{OMX}{yhex}{m}{n}
```

Next, the four "wide" accents are defined, in a way similar to LaTeX and not to $\mathcal{A}\!\mathcal{M}\!\mathcal{S}$-LaTeX, so `yhmath` must be loaded after `amsmath`!

```
\DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{"65}
\DeclareMathAccent{\widehat}{\mathord}{largesymbols}{"62}
\DeclareMathAccent{\widetriangle}{\mathord}{largesymbols}{"E6}
\DeclareMathAccent{\wideparen}{\mathord}{largesymbols}{"F3}
```

The `amatrix` environment is defined

```
\newenvironment{amatrix}{\left\langle\begin{matrix}}{\end{matrix}\right\rangle}
```

And now the `\adots` macro for anti-diagonal dots. This is just the `\ddots` command, mirrored

```
\def\adots{\mathinner{\mkern2mu\raise\p@\hbox{.}
\mkern2mu\raise4\p@\hbox{.}\mkern1mu
\raise7\p@\vbox{\kern7\p@\hbox{.}}\mkern1mu}}
```

Following the way $\mathcal{A}\!\mathcal{M}\!\mathcal{S}$-LaTeX defines math accents, here is the definition of `\ring`. family.

```
\edef\@tempa#1#2{\def#1{\mathaccent\string"\noexpand\accentclass@#2 }}
```

```
\@tempa\ring{017}
```

And finally here is a (clumsy) definition of `\widering`, that is a ring over an horizontal parenthesis.

```
\newcommand{\widering}[1]{\overset{\smash{\vbox to .2ex{%
\hbox{$\mathring{}$}}}}{\wideparen{#1}}}
```

⟨/package⟩

⟨*fdfile⟩

Follows the FD file. Here we define the `yhex` family, at least for the OMX (Old Math Extensible symbols) encoding

```
\ProvidesFile{OMXyhex.fd}
          [1996/01/04 v1.0 YH’s humble contribution to TeX maths]
\DeclareFontFamily{OMX}{yhex}{}{}
\DeclareFontShape{OMX}{yhex}{m}{n}{
  <-> sfixed * yhcmex10
  }{}
```

⟨/fdfile⟩