

# My humble additions to (La)T<sub>E</sub>X mathematics\*

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## Abstract

This package provides a set of big delimiters, intermediate to those of the original T<sub>E</sub>X, and also much bigger. It also provides very wide accents (including two new ones: parenthesis and triangle). These symbols are included in a font which has Don's `cmex10` as lower ASCII part.

## 1 Installation

This package consists of (a) a font, written in Metafont, (b) a L<sup>A</sup>T<sub>E</sub>X style file, (c) a FD file for the OMX encoding using the new font. 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).

Then take the `OMXyhhex.fd` file and put it together with your other FD (Font Definition) files; and `yhmath.sty` together with your other L<sup>A</sup>T<sub>E</sub>X styles. Have fun!

## 2 Availability

Don Knuth's code is included in Metafont files, so this code is under the usual T<sub>E</sub>Xware ©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 T<sub>E</sub>X's `charlist` font property, and

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make some more of those big delimiters. I also did intermediate sizes (for all “big” delimiters). Here are some examples :

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

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

## 4 A new $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\text{\LaTeX}$ -like matrice-like environment

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  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\text{\LaTeX}$ -like environment `amatrix` (“a” for “angle”). I hope AMS people will just love it and include it into  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\text{\LaTeX}$ !<sup>1</sup>

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

$$\langle a \ b \rangle \langle a \ b \ c \rangle \langle a \ b \ c \ d \rangle \quad (3)$$

$$\langle c \ d \rangle \langle d \ e \ f \rangle \langle e \ f \ g \ h \rangle$$

$$\langle i \ j \ k \ l \rangle \langle m \ n \ o \ p \rangle$$

$$\langle a \ b \ c \ d \ e \rangle \langle a \ b \ c \ d \ e \ f \rangle \quad (4)$$

$$\langle f \ g \ h \ i \ j \rangle \langle g \ h \ i \ j \ k \ l \rangle$$

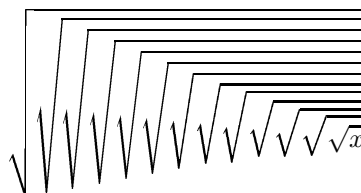
$$\langle k \ l \ m \ n \ o \rangle \langle m \ n \ o \ p \ q \ r \rangle$$

$$\langle p \ q \ r \ s \ t \rangle \langle s \ t \ u \ v \ w \ x \rangle$$

$$\langle u \ v \ w \ x \ y \rangle \langle y \ z \ \alpha \ \beta \ \gamma \ \delta \rangle$$

## 5 New roots

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



<sup>1</sup>Talking of  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\text{\LaTeX}$  there are a few more macros I would like to see included, see next section.

## 6 A few things missing from $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$ v1.2

`\adots` In  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$  there is a `\ddots` command for diagonal dots. How about anti-diagonal 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 symmetric to `\ddots`, here is the result:  $\cdot\cdot^{\cdot}$ .

`\ring` Another thing missing in all  $\mathcal{T}\mathcal{E}\mathcal{X}$  & 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  $\overset{\circ}{X} = ]0, 1[$ .

## 7 Very wide accents

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

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

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

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?  $\widehat{ABC}$  is a triangle,  $\widehat{ABC}$  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  $\mathcal{A}\mathcal{M}\mathcal{S}$ - $\mathcal{L}\mathcal{A}\mathcal{T}\mathcal{E}\mathcal{X}$  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

$\overset{\circ}{[0, 1]}$

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}`):

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

## 8 The code

```
1 (*package)
We require that the amsmath package is loaded:
2 \RequirePackage{amsmath}
First of all we have to ask LATEX to use our brand new font for “large symbols”
3 \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!
4 \DeclareMathAccent{\widetilde}{\mathord}{largesymbols}{"65}
5 \DeclareMathAccent{\widehat}{\mathord}{largesymbols}{"62}
6 \DeclareMathAccent{\widetriangleright}{\mathord}{largesymbols}{"E6}
7 \DeclareMathAccent{\wideparen}{\mathord}{largesymbols}{"F3}
The amatrix environment is defined
8 \newenvironment{amatrix}{\left\langle\begin{matrix}}{\end{matrix}\right\rangle}
And now the \adots macro for anti-diagonal dots. This is just the \ddots com-
mand, mirrored
9 \def\adots{\mathinner{\mkern2mu\raise\p@\hbox{.}
10 \mkern2mu\raise4\p@\hbox{.}\mkern1mu
11 \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.
12 \edef\@tempa#1#2{\def#1{\mathaccent\string"noexpand\accentclass@#2 }}
13 \@tempa\ring{017}
And finally here is a (clumsy) definition of \widering, that is a ring over an
horizontal parenthesis.
14 \newcommand{\widering}[1]{\overset{\smash{\lower1.333ex\hbox{${}
15 \displaystyle\ring{}}}}{\wideparen{#1}}}
16 \end{package}
17 \end{fdfile}
Follows the FD file. Here we define the yhex family, at least for the OMX (Old
Math Extensible symbols) encoding
18 \ProvidesFile{OMXyhex.fd}
19 [1996/01/04 v1.0 YH's humble contribution to TeX maths]
20 \DeclareFontFamily{OMX}{yhex}{-}{-}
21 \DeclareFontShape{OMX}{yhex}{m}{n}{
22 <-> sfixed * yhcmex10
23 }{}
24 \end{fdfile}
```