The Virtual Font Package fonts for LaTeX 2¶ 1.0 Release

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1 Introduction

comes with a full set of mathematical fonts in PostScript format. These fonts can be used to typeset mathematical texts together with the standard PostScript font, Times-Roman. To use the fonts together with TeX and the macro package LaTeX 2¶ [2], more than just the plain PostScript Type1 fonts are needed. TeX must be informed about the dimensions of the characters and, for typesetting mathematics, TeX needs the information on how to change the sizes of the operators and delimiters coded in the fonts [3].

TeX provides the virtual font mechanism to borrow characters from certain fonts and to assemble new ones. has introduced some new symbols like $= \overline{-1}$ and ª for the base of the natural logarithm and the mathematical alphabets ˆ Ł ° , ¤›¡¢ and Script with lower c alphabets can be found in the font sets of the American Mathematical Society. The virtual fonts zw*.vf, zw*.tfm and the style file mmasym.sty replace the standard computer modern fonts with the Times-Roman family for normal text, Helvetica family for sansserif text, and the Courier family for monotype text. The four mathematical fonts for operators, letters, symbols and extensible symbols are replaced by the virtual fonts of the zwa family. The first 128 characters of the new fonts conform to the standard TeX encoding for mathematical fonts. Some of the slots with higher character codes are used for the new symbols. The main part of mmasym.sty deals with the setup of the new symbols.

The virtual fonts where created with Alan Jeffrey's fontinst package [1].

2 Files and Installation

To use the fonts an DVI-driver that understands virtual fonts like dvips is needed. The new fonts all start with the zw letters. The combination with Times is indicated by the letter a, the mono spaced fonts by the letter c. A single character follows for the kind of font and the next character refers to the weight of the font.

zwa	r	m	OT1	medium weigth operator
zwa	m	m	OML	medium weigth math italic
zwa	y	m	OMS	medium weigth symbol
zwa	v	m	OMX	medium weigth math extensions
zwc	r	m	OT1	Courier medium weigth operator
zwc	m	m	OML	Courier medium weigth math italic
zwc	y	m	OMS	Courier medium weigth symbol
zwc	v	m	OMX	Courier medium weigth math extensions
zwa	r	b	OT1	bold operator
zwa	m	b	OML	bold math italic
zwa	y	b	OMS	bold symbol
zwa	v	b	OMX	bold math extensions
zwc	r	b	OT1	Courier bold operator
zwc	m	b	OML	Courier bold math italic
zwc	y	b	OMS	Courier bold symbol
zwc	v	b	OMX	Courier bold math extensions
zws		m	U	keyboard and text symbols

TeX needs the font metric files (*.tfm), the virtual fonts (*.vf) and the native font metric files from the fonts (i.e. Math1.tfm, Math2.tfm, ...). LaTeX 2¶ needs the font definition files OT1zw*r.fd, OMLzw*m.fd, OMSzw*y.fd and OMXzw*v.fd to access the fonts. Additionally, the font definitions for the Times-Roman (OT1ptm.fd), Helvetica (OT1phv.fd) and Courier fonts (OT1pcr.fd) are needed for the style file mmasym.sty. The last three files comes usual with the LaTeX 2¶ packages in the psnfss directory.

A DVI driver creating PostScript output must be informed to download the Type 1 fonts. For dvips this is done by adding the map file mma.map

```
Math1        Math1        <Math1.pfa
Math1-Bold   Math1-Bold   <Math1-Bold.pfa
Math2        Math2        <Math2.pfa
Math2-Bold   Math2-Bold   <Math2-Bold.pfa
Math3        Math3        <Math3.pfa
Math3-Bold   Math3-Bold   <Math3-Bold.pfa
Math4        Math4        <Math4.pfa
Math4-Bold   Math4-Bold   <Math4-Bold.pfa
Math5        Math5        <Math5.pfa
Math5-Bold   Math5-Bold   <Math5-Bold.pfa
Math1Mono      Math1Mono <Math1Mono.pfa
Math1Mono-Bold Math1Mono-Bold <Math1Mono-Bold.pfa
Math2Mono      Math2Mono <Math2Mono.pfa
Math2Mono-Bold Math2Mono-Bold <Math2Mono-Bold.pfa
Math3Mono      Math3Mono <Math3Mono.pfa
Math3Mono-Bold Math3Mono-Bold <Math3Mono-Bold.pfa
Math4Mono      Math4Mono <Math4Mono.pfa
Math4Mono-Bold Math4Mono-Bold <Math4Mono-Bold.pfa
```

```
Math5Mono      Math5Mono <Math5Mono.pfa
Math5Mono-Bold Math5Mono-Bold <Math5Mono-Bold.pfa
```

to the config.ps file with

```
p+ mma.map
```

Additionaly the environment variables of dvips must be updated to append the directory with the fonts.

Important Note: This map file includes the fonts into your PostScript output and these fonts can be extracted from the resulting PostScript file. If the PostScript file is sent to people without a license, Wolfram Research, Inc., will probably interpret this as a violation of its copyright.

One way to avoid this problem is to make the fonts available to your resident PostScript interpretor (Your PostScript interpretor might be your copy of GhostScript, your PostScript printer, or some other PostScript rasterizing system.) and then to not include the fonts into your PostScript file. The file would then contain only references to the appropriate fonts instead of the fonts themselves.

Once the fonts are available to your PostScript interpretor, you need not include them into your PostScript file, and you can freely distribute your PostScript file. Only the people who already have the fonts will be able to correctly view your PostScript file. This behavior can be achieved with the following revised mapping file.

```
Math1       Math1
Math1-Bold  Math1-Bold
Math2       Math2
Math2-Bold  Math2-Bold
Math3       Math3
Math3-Bold  Math3-Bold
Math4       Math4
Math4-Bold  Math4-Bold
Math5       Math5
Math5-Bold  Math5-Bold
Math1Mono      Math1Mono
Math1Mono-Bold Math1Mono-Bold
Math2Mono      Math2Mono
Math2Mono-Bold Math2Mono-Bold
Math3Mono      Math3Mono
Math3Mono-Bold Math3Mono-Bold
Math4Mono      Math4Mono
Math4Mono-Bold Math4Mono-Bold
Math5Mono      Math5Mono
Math5Mono-Bold Math5Mono-Bold
```

If the fonts aren't available to your PostScript interpretor, dvips must find the fonts for inclusion and the environment variable `DVIPSHEADERS` must include the font directory that contains the Type 1 fonts.

To setup the fonts for GhostScript two things must be done. At first add the PostScript fonts to the fontmap file in the GhostScript directory. This is done simply by appending the lines:

```
/Math1-Bold        (Math1-Bold.pfa);
/Math1             (Math1.pfa);
/Math1Mono-Bold    (Math1Mono-Bold.pfa);
/Math1Mono         (Math1Mono.pfa);
/Math2-Bold        (Math2-Bold.pfa);
/Math2             (Math2.pfa);
/Math2Mono-Bold    (Math2Mono-Bold.pfa);
/Math2Mono         (Math2Mono.pfa);
/Math3-Bold        (Math3-Bold.pfa);
/Math3             (Math3.pfa);
/Math3Mono-Bold    (Math3Mono-Bold.pfa);
/Math3Mono         (Math3Mono.pfa);
/Math4-Bold        (Math4-Bold.pfa);
/Math4             (Math4.pfa);
/Math4Mono-Bold    (Math4Mono-Bold.pfa);
/Math4Mono         (Math4Mono.pfa);
/Math5-Bold        (Math5-Bold.pfa);
/Math5             (Math5.pfa);
/Math5Mono-Bold    (Math5Mono-Bold.pfa);
/Math5Mono         (Math5Mono.pfa);
```

to the font map. The second step is to tell GhostScript where the fonts can be found. This is typical done by setting/appending the directory with the fonts (typical /usr/local/mathematica/SystemFiles/Fonts/Type1) to the `GS_LIB` environment variable in Your login shell script.

All the stuff comes in an archive file mmafnt.zip with a TDS conform structure. Change to the directory where the texmf directory resides and unzip it with the full directory information. Modify the config.ps file and the `DVIPSHEADERS` environment variable and this document should compile with LaTeX 2¶.

To use the package with your own files add the line

```
\usepackage{mmasym}
```

to the preamble of your LaTeX 2¶ document.

3 Typesetting Notebooks

Apart from the production of bitmap free TeX output You may use mono spaced mathematical fonts. This is of limited interest in usual mathematical texts but for typesetting the `In[]` and `Out[]` cells of notebooks. For that propose mmasym.sty introduce tow new mathematic styles. The mmasym.sty package has an option `monospacemath`. If the package is loaded with:

The Dirac equation for a free particle:

$$\frac{¶y}{¶t} = \hat{H}_f y = J\ \hat{a}\,\hat{p} + m_0\ {}^2\,\hat{b}Ny$$

The integral representation of Bessel function $J_n(z)$:

$$J_n(z) \;=\; \frac{1}{p}\,{}_0^{p}\cos(z\sin(q) - nq)\quad q$$
$$-\frac{\sin(np)}{p}\;{}_0^{¥}\;a^{z\sinh t - nt}\quad t\quad (|\arg z| < \frac{1}{2}p)$$

The expansion of Coulomb wave functions in terms of Bessel-Clifford functions:

$$F_L(h, •) = C_L(h)\frac{(2L+1)!}{(2h)^{2L+1}}r^{-L}\;{}_{k=2L+1}^{¥}\;b_k t^{k/2} I_k(2^{0}\bar{t})$$

with $b_{2L+1} = 1$, $b_{2L+2} = 0$ and $4h^2\ (k - 2L)\,b_{k+1} + k\,b_{k-1} + b_{k-2} = 0$.
A radical idenity:

$$2\;\frac{1}{2}\;\;3\;\frac{1}{2}+\frac{1}{2}\;\;2\;\frac{1}{2}\;\;6\!\!\!\!4\;\;\frac{1}{2}+\frac{1}{2}\;\;3\;\frac{1}{2}+\frac{1}{2}\;\;2\;\frac{1}{2}\ldots = \frac{2}{p}$$

Figure 1: The normal mathematics style

```
\usepackage[monospacemath]{mmasym}
```

the monospaced fonts will be present and two new mathversions are defined. For medium weight mono spaced output the math-style `mono` is introduced and for bold mono spaced mathematics the `monobold`. By default the mono spaced fonts will not be loaded.

Like the `\boldmath` or `\mathversion{bold}` the command `\monomath` or `\mathversion{mono}` and `\monoboldmath` or `\mathversion{monobold}` will switch to the new styles. Remember that the switch must be outside of a mathematical formula. Typesetting notebooks will need mutch more macros than mmasym.sty introduces. Here are a few examples of the different styles.

One difference between the mono spaced output and the fonts used for "The Book" is that the variables typesetted in italic. This is the correct behaviour for mathematics but it looks strange for constructs like

$$\mathtt{\mathit{Expand}[(\mathit{x}^2 + 1)^{100}]}$$

I recommend definitions like

The Dirac equation for a free particle:

$$\frac{\partial\psi}{\partial t} = \hat{H}_f\psi = \vartheta\ \hat{\alpha}\,\hat{p} + m_0\ {}^{2}\,\hat{\beta}N\psi$$

The integral representation of Bessel function $J_\nu(z)$:

$$J_\nu(z) \;=\; \frac{1}{\pi}\ {}_{0}^{\pi}\cos(z\sin(\theta) - \nu\theta)\ \theta$$
$$-\ \frac{\sin(\nu\pi)}{\pi}\ {}_{0}^{\infty}\ \underline{a}^{\,z\sinh t - \nu t}\ t\ \ (|\arg z| < \tfrac{1}{2}\pi)$$

The expansion of Coulomb wave functions in terms of Bessel-Clifford functions:

$$F_L(\eta,\bullet) = C_L(\eta)\frac{(2L+1)!}{(2\eta)^{2L+1}}\rho^{-L}\ {}_{k=2L+1}^{\infty}\ b_k t^{k/2} I_k(2\ \overset{0}{\bar{t}})$$

with $b_{2L+1} = 1$, $b_{2L+2} = 0$ and $4\eta^2(k - 2L)\,b_{k+1} + k\,b_{k-1} + b_{k-2} = 0$.
A radical idenity:

$$2\ \frac{1}{2}\quad 3\ \frac{1}{2} + \frac{1}{2}\ 2\ \frac{1}{2}\quad 6\,4\ \frac{1}{2} + \frac{1}{2}\ 3\ \frac{1}{2} + \frac{1}{2}\ 2\ \frac{1}{2}\ldots = \frac{2}{\pi}$$

Figure 2: The bold mathematics style

The Dirac equation for a free particle:

$$\frac{¶\mathrm{y}}{¶t} = \hat{H}_f \mathrm{y} = \mathrm{J}\ \ \hat{\mathrm{a}}\,\hat{p} + m_0\ \ {}^2\hat{\mathrm{b}}\mathrm{N}\ \mathrm{y}$$

The integral representation of Bessel function $J_{\mathrm{n}}(z)$:

$$J_{\mathrm{n}}(z) \quad = \quad \frac{1}{\mathrm{p}}\ {}_0^{\mathrm{p}}\ \cos(z \sin(\mathrm{q}) - \mathrm{n}\,\mathrm{q})\ \ \mathrm{q}$$
$$-\frac{\sin(\mathrm{np})}{\mathrm{p}}\ {}_0^{¥}\ \mathrm{a}^{z \sinh t - \mathrm{n}\,t}\ \ t\ \ (\left| \arg z \right| < \frac{1}{2}\mathrm{p})$$

The expansion of Coulomb wave functions in terms of Bessel-Clifford functions:

$$F_L(\mathrm{h}, \bullet) = C_L(\mathrm{h})\,\frac{(2\,L+1)\,!}{(2\,\mathrm{h})^{2\,L+1}}\,\mathrm{r}^{-L}\ \ {}_{k=2\,L+1}^{¥}\ \ b_k t^{k/2} I_k(2\ {}^{0}\overline{\ \ t})$$

with $b_{2\,L+1} = 1$, $b_{2\,L+2} = 0$ and $4\mathrm{h}^2\ (k - 2\,L)\ b_{k+1} + k\,b_{k-1} + b_{k-2} = 0$.
A radical idenity:

$$2\ \overline{\ \ }\ \frac{1}{2}\quad 3\ \overline{\frac{1}{2} + \frac{1}{2}\quad 2\ \overline{\ \ }\ \frac{1}{2}}\quad \begin{smallmatrix}6\\4\end{smallmatrix}\ \overline{\frac{1}{2} + \frac{1}{2}\quad 3\ \overline{\frac{1}{2} + \frac{1}{2}\quad 2\ \overline{\ \ }\ \frac{1}{2}}}\ \ldots = \frac{2}{\mathrm{p}}$$

Figure 3: The mono mathematics style

The Dirac equation for a free particle:

$$\frac{\P y}{\P t} = \hat{H}_f y = J \;\; \hat{a}\, \hat{p} + m_0 \;\; ^2 \hat{b} N y$$

The integral representation of Bessel function $J_n(z)$:

$$J_n(z) \;\;=\;\; \frac{1}{p} \;_0^{p} \cos(z \sin(q) - n q) \;\; q$$
$$- \frac{\sin(np)}{p} \;_0^{¥} \underline{a}^{\, z \sinh t - n t} \;\; t \; (| \arg z| < \frac{1}{2} p)$$

The expansion of Coulomb wave functions in terms of Bessel-Clifford functions:

$$F_L(h, \bullet) = C_L(h) \frac{(2L+1)!}{(2h)^{2L+1}} r^{-L} \sum_{k=2L+1}^{¥} b_k t^{k/2} I_k(2 \overset{0}{\;} \overline{t})$$

with $b_{2L+1} = 1$, $b_{2L+2} = 0$ and $4h^2 (k - 2L) b_{k+1} + k b_{k-1} + b_{k-2} = 0$.
A radical idenity:

$$2 \; \frac{1}{2} \quad 3 \; \frac{1}{2} + \frac{1}{2} \;\; 2 \; \frac{1}{2} \quad 6 \, 4 \; \frac{1}{2} + \frac{1}{2} \;\; 3 \; \frac{1}{2} + \frac{1}{2} \;\; 2 \; \frac{1}{2} \cdots = \frac{2}{p}$$

Figure 4: The mono bold mathematics style

```
\newcommand{\Expand}{{\mathop{\mathrm{Expand}}}}
```

to get

$$\texttt{Expand[(}x^2+\texttt{1)}^{\texttt{100}}\texttt{]}$$

.

4 Symbol Names

The names, in most cases, are too long. The TEX command for a symbol is the name of the corresponding AMS font symbol if it exists, otherwise a alias or name is used. Negated relations start allways with the letter `n` and the TEX, AMS-TEX name follows. Even if it not explicit listed in the following tables, an alias due to the naming convention may exist.

For the additional alphabets the full name, the aliases of the frontend, the AMS font switching mechanism using `\mathcal{}` for script, `\mathfrak{}` for s gothic, and `\mathbb{}` for double struck characters, are all working. For single letters I recommend the alias of the frontend because the macros for character replacement in the `\mathcal{}`, `mathbb{}` and `\mathfrak{}` commands are a bit time consuming.

References

[1] Michel Gossens, Sebastian Rahtz, Frank Mittlebach, *The LATEX Graphics Companion*, Addison-Wesley, 1997

[2] Michel Gossens, Frank Mittlebach, Alexander Samarin, *The LATEX Companion*, Addison-Wesley, 1994

[3] Donald E. Knuth, *The TEXbook*, Addison-Wesley, 1984

A Character Tables

The following tables give the reference of the defined characters and symbols when the mmasym.sty package is used.

Table 1: Additional Characters

Name	Alias	normal	bold
\ee	\ExponetialE	ª	ª
\ii	\ComplexI		
\jj	\ComplexJ		
\dd	\DifferentialD		
\DD	\CapitalDifferentialD		
\DoublePi			
\EulerGamma			
\ScriptDotlessI			
\ScriptDotlessJ			
\HBar	\hbar		
\Mho			
\lambdaslash			
\Angstroem			
\beth		…	…
\daleth			
\gimel		‰	‰
\Digamma		†	†
\Stigma		‡	‡
\Koppa		·	·
\Sampi			
\digamma		'	'
\stigma		„	„
\koppa		”	”
\sampi		»	»
\varkappa		¿	¿
\Euler	\euler	ß	ß
\Micro		—	—

Table 2: Script Characters, the `\mathcal` can be used to get several Script characters.

\ScriptCapitalA	\scA	A	\ScriptA	\sca	a
\ScriptCapitalB	\scB	B	\ScriptB	\scb	b
\ScriptCapitalC	\scC	C	\ScriptC	\scc	c
\ScriptCapitalD	\scD	D	\ScriptD	\scd	d
\ScriptCapitalE	\scE	E	\ScriptE	\sce	e
\ScriptCapitalF	\scF	F	\ScriptF	\scf	f
\ScriptCapitalG	\scG	G	\ScriptG	\scg	g
\ScriptCapitalH	\scH	H	\ScriptH	\sch	h
\ScriptCapitalI	\scI	I	\ScriptI	\sci	i
\ScriptCapitalJ	\scJ	J	\ScriptJ	\scj	j
\ScriptCapitalK	\scK	K	\ScriptK	\sck	k
\ScriptCapitalL	\scL	L	\ScriptL	\scl	l
\ScriptCapitalM	\scM	M	\ScriptM	\scm	m
\ScriptCapitalN	\scN	N	\ScriptN	\scn	n
\ScriptCapitalO	\scO	O	\ScriptO	\sco	o
\ScriptCapitalP	\scP	P	\ScriptP	\scp	p
\ScriptCapitalQ	\scQ	Q	\ScriptQ	\scq	q
\ScriptCapitalR	\scR	R	\ScriptR	\scr	r
\ScriptCapitalS	\scS	S	\ScriptS	\scs	s
\ScriptCapitalT	\scT	T	\ScriptT	\sct	t
\ScriptCapitalU	\scU	U	\ScriptU	\scu	u
\ScriptCapitalV	\scV	V	\ScriptV	\scv	v
\ScriptCapitalW	\scW	W	\ScriptW	\scw	w
\ScriptCapitalX	\scX	X	\ScriptX	\scx	x
\ScriptCapitalY	\scY	Y	\ScriptY	\scy	y
\ScriptCapitalZ	\scZ	Z	\ScriptZ	\scz	z

Table 3: Double Struck Characters, the \mathbb can be used to get several ˆ Ł ° characters.

\DoubleStruckCapitalA	\dsA		\DoubleStruckA	\dsa	
\DoubleStruckCapitalB	\dsB	`	\DoubleStruckB	\dsb	
\DoubleStruckCapitalC	\dsC	´	\DoubleStruckC	\dsc	
\DoubleStruckCapitalD	\dsD	ˆ	\DoubleStruckD	\dsd	
\DoubleStruckCapitalE	\dsE	˜	\DoubleStruckE	\dse	
\DoubleStruckCapitalF	\dsF	¯	\DoubleStruckF	\dsf	
\DoubleStruckCapitalG	\dsG	˘	\DoubleStruckG	\dsg	
\DoubleStruckCapitalH	\dsH	˙	\DoubleStruckH	\dsh	Æ
\DoubleStruckCapitalI	\dsI	¨	\DoubleStruckI	\dsi	
\DoubleStruckCapitalJ	\dsJ		\DoubleStruckJ	\dsj	ª
\DoubleStruckCapitalK	\dsK	…	\DoubleStruckK	\dsk	
\DoubleStruckCapitalL	\dsL	¸	\DoubleStruckL	\dsl	
\DoubleStruckCapitalM	\dsM		\DoubleStruckM	\dsm	
\DoubleStruckCapitalN	\dsN	˝	\DoubleStruckN	\dsn	
\DoubleStruckCapitalO	\dsO	˛	\DoubleStruckO	\dso	Ł
\DoubleStruckCapitalP	\dsP	ˇ	\DoubleStruckP	\dsp	Ø
\DoubleStruckCapitalQ	\dsQ	—	\DoubleStruckQ	\dsq	Œ
\DoubleStruckCapitalR	\dsR		\DoubleStruckR	\dsr	°
\DoubleStruckCapitalS	\dsS		\DoubleStruckS	\dss	
\DoubleStruckCapitalT	\dsT		\DoubleStruckT	\dst	
\DoubleStruckCapitalU	\dsU		\DoubleStruckU	\dsu	
\DoubleStruckCapitalV	\dsV		\DoubleStruckV	\dsv	
\DoubleStruckCapitalW	\dsW		\DoubleStruckW	\dsw	
\DoubleStruckCapitalX	\dsX		\DoubleStruckX	\dsx	æ
\DoubleStruckCapitalY	\dsY		\DoubleStruckY	\dsy	
\DoubleStruckCapitalZ	\dsZ		\DoubleStruckZ	\dsz	

Table 4: Gothic Characters, the `\mathfrak` can be used to get ¤›¡¢ characters.

\GothicCapitalA	\goA	·	·	\GothicA	\goa		
\GothicCapitalB	\goB			\GothicB	\gob		
\GothicCapitalC	\goC			\GothicC	\goc		
\GothicCapitalD	\goD			\GothicD	\god	″	”
\GothicCapitalE	\goE			\GothicE	\goe	»	»
\GothicCapitalF	\goF			\GothicF	\gof		
\GothicCapitalG	\goG			\GothicG	\gog		
\GothicCapitalH	\goH			\GothicH	\goh	¡	¡
\GothicCapitalI	\goI			\GothicI	\goi	¢	¢
\GothicCapitalJ	\goJ			\GothicJ	\goj	£	£
\GothicCapitalK	\goK			\GothicK	\gok	⁄	/
\GothicCapitalL	\goL			\GothicL	\gol	¥	¥
\GothicCapitalM	\goM			\GothicM	\gom	ƒ	ƒ
\GothicCapitalN	\goN	¶	¶	\GothicN	\gon	§	§
\GothicCapitalO	\goO	•	•	\GothicO	\goo	¤	¤
\GothicCapitalP	\goP	‚	‚	\GothicP	\gop	'	'
\GothicCapitalQ	\goQ	„	„	\GothicQ	\goq	‟	“
\GothicCapitalR	\goR			\GothicR	\gor	«	«
\GothicCapitalS	\goS			\GothicS	\gos	‹	‹
\GothicCapitalT	\goT			\GothicT	\got	›	›
\GothicCapitalU	\goU			\GothicU	\gou	fi	fi
\GothicCapitalV	\goV			\GothicV	\gov	fl	fl
\GothicCapitalW	\goW			\GothicW	\gow		
\GothicCapitalX	\goX			\GothicX	\gox	–	–
\GothicCapitalY	\goY			\GothicY	\goy	†	†
\GothicCapitalZ	\goZ			\GothicZ	\goz	‡	‡

Table 5: Integral signs

TEX-Command			
\int		${}_a^b f(x) \quad x$	${}^b_a f(x) \quad x$
		${}_a^b f(x) \quad x$	${}^b_a f(x) \quad x$
\oint		${}_C f(z) \quad z$	¤ ${}_C f(z) \quad z$
		${}_C f(z) \quad z$	¤ ${}_C f(z) \quad z$
\dbloint		${}_G f(u,v) \quad u \quad v$	' ${}_G f(u,v) \quad u \quad v$
		${}_G f(u,v) \quad u \quad v$	' ${}_G f(u,v) \quad u \quad v$
\clockoint		${}_G f(z) \quad z$	« ${}_G f(z) \quad z$
		${}_G f(z) \quad z$	« ${}_G f(z) \quad z$
\cntclockoint		${}_G f(z) \quad z$	" ${}_G f(z) \quad z$
		${}_G f(z) \quad z$	" ${}_G f(z) \quad z$
\sqrint		${}_G f(z) \quad z$	‹ ${}_G f(z) \quad z$
		${}_G f(z) \quad z$	‹ ${}_G f(z) \quad z$
\fint	″	″ ${}_{-¥}^{¥} \frac{f(x)}{x} \quad x$	‘ ${}_{-¥}^{¥} \frac{f(x)}{x} \quad x$
		″ ${}_{-¥}^{¥} \frac{f(x)}{x} \quad x$	‘ ${}_{-¥}^{¥} \frac{f(x)}{x} \quad x$

Table 6: Additional and changed arrows 1

\HookLeftArrow	O	*a* O *b*
\HookRightArrow	N	*a* N *b*
\MapsTo	#	*a* # *b*
\MapsFrom	"	*a* " *b*
\MapsUp	&	[illegible]
\MapsDown	'	[illegible]
\ShortUpArrow	w	*a* w *b*
\ShortDownArrow	x	*a* x *b*
\ShortRightArrow	z	*a* z *b*
\ShortLeftArrow	y	*a* y *b*
\LongLeftArrow		*a* *b*
\longleftarrow		*a* *b*
\LongRightArrow		*a* *b*
\longrightarrow		*a* *b*
\LongLeftRightArrow		*a* *b*
\longleftrightarrow		*a* *b*
\DblLongLeftArrow		*a* *b*
\Longleftarrow		*a* *b*
\DblLongRightArrow		*a* *b*
\Longrightarrow		*a* *b*
\DblLongLeftRightArrow		*a* *b*
\Longleftrightarrow		*a* *b*

Table 7: Additional and changed arrows 2

\RightVectorBar	)	a) b
\LeftVectorBar	(	a (b
\DownRightVectorBar	+	a + b
\DownLeftVectorBar	*	a * b
\RightTeeVector	-	a - b
\LeftTeeVector	,	a , b
\DownRightTeeVector	/	a / b
\DownLeftTeeVector	.	a . b
\RightArrowBar	!	a ! b
\LeftArrowBar	{	a { b
\leftrightharpoonup	2	a 2 b
\leftrightharpoondown	5	a 5 b
\equilibrium	F	a F b
\revequilibrium	G	a G b
\Equilibrium	H	I a H Ib
\RevEquilibrium	J	K a J Kb
\upharpoonleftup	@	@AA @AA @AAAA @AAAAAAAAAA
\upharpoonleftdown	B	AAB AAB AAAAB AAAAAAAAAAB
\upharpoonrightup	C	CDD CDD CDDD CDDDDDDDDD
\upharpoonrightdown	E	DDE DDE DDDDE DDDDDDDDDE
\leftupdownharpoon	6	@B @AB @AAB @AAAAB
\rightupdownharpoon	7	CE CDE CDDE CDDDDE
\UpArrowBar	$	$%% $%%% $%%%%% $%%%%%%%%%%
\DownArrowBar	%	%%%% %%%%% %%%%%%%% %%%%%%%%%%%%

Table 8: Additional and changed arrows 3

\LeftUpTeeVector	<	[illegible]
\RightUpTeeVector	>	[illegible]
\LeftDownTeeVector	=	[illegible]
\RightDownTeeVector	?	[illegible]
\LeftUpVectorBar	8	[illegible]
\RightUpVectorBar	:	[illegible]
\LeftDownVectorBar	9	[illegible]
\RightDownVectorBar	;	[illegible]
\upequilibrium	L	[illegible]
\uprevequilibrium	M	[illegible]
\rightleftarrow	V	*a* V *b*
\leftrightarrow	W	*a* W *b*
\uparrowdownarrow	\	[illegible]
\downarrowuparrow	]	[illegible]

Table 9: Extensible Horizontal Arrows. All arrows have a length argument.

TEXcommand	Symbol	Example
`\RightArrowFill`*[length]*	−fi	*a* ——fi *b*
`\LeftArrowFill`*[length]*	‹—	*a* ‹—— *b*
`\LRArrowFill`*[length]*	‹fi	*a* ‹—fi *b*
`\DblRightArrowFill`*[length]*		*a* *b*
`\DblLeftArrowFill`*[length]*		*a* *b*
`\DblLRArrowFill`*[length]*		*a* *b*
`\RightHarpoonUpFill`*[length]*	[illegible]	*a* [illegible] *b*
`\LeftHarpoonUpFill`*[length]*	0[illegible]	*a* 0[illegible]*b*
`\RightHarpoonDownFill`*[length]*	[illegible]	*a* [illegible] *b*
`\LeftHarpoonDownFill`*[length]*	3[illegible]	*a* 3[illegible]*b*
`\LRHarpoonUpFill`*[length]*	01	*a* 0[illegible] *b*
`\LRHarpoonDownFill`*[length]*	34	*a* 3[illegible] *b*
`\EquilibriumFill`*[length]*	H	I *a* H I*b*
`\RevEquilibriumFill`*[length]*	J	K *a* J K*b*
`\RightLeftArrowFill`*[length]*	X	Y *a* X Y*b*
`\LeftRightArrowFill`*[length]*	[	Z *a* [Z*b*

Table 10: Mathematica specials

`\Rule`	fi	*a* fi *b*
`\RuleDelayed`	ƒ	*a* ƒ *b*
`\SetDelayed`		*a* *b*
`\Equal`		*a* *b*
`\Same`	X	*a* X *b*
Double brackets		
`\lpart`	P	QR
`\rpart`	T	UV
`\llbracket`	P	QR
`\rrbracket`	T	UV

Table 11: Dot's as time derivative

`\Dot`	$\dot{a}(t)$	$\boldsymbol{\dot{a}(t)}$
`\DDot`	$\overline{a}(t)$	$\boldsymbol{\overline{a(t)}}$
`\DDDot`	$a(t)$	$\boldsymbol{a(t)}$
`\vec`	A	$\boldsymbol{A}$
`\lrvec`	A	$\boldsymbol{A}$
`\lvec`	A	$\boldsymbol{A}$
`\Vec`	A	$\boldsymbol{A}$
`\LRVec`	A	$\boldsymbol{A}$
`\LVec`	A	$\boldsymbol{A}$

Table 12: Over- and underbraces, brackets ...

`\overparen`{*argument*} `\underparen`{*argument*}	$a + b$ $a + b$	$a + b + c$ $a + b + c$	$a + b + x + y$ $a + b + x + y$
`\overbracket`{*argument*} `\underbracket`{*argument*} `\OverBracket`{*argument*} `\UnderBracket`{*argument*}	$a + b$ $a + b$ $a + b$ $a + b$	$a + b + c$ $a + b + c$ $a + b + c$ $a + b + c$	$a + b + x + y$ $a + b + x + y$ $a + b + x + y$ $a + b + x + y$
`\overbrace`{*argument*} `\underbrace`{*argument*}	$a + b$ $a + b$	$a + b + c$ $a + b + c$	$a + b + x + y$ $a + b + x + y$
`\overleftarrow`{*argument*} `\overrightarrow`{*argument*}	$\overleftarrow{a + b}$ $\overrightarrow{a + b}$	$\overleftarrow{a + b + c}$ $\overrightarrow{a + b + c}$	$\overleftarrow{a + b + x + y}$ $\overrightarrow{a + b + x + y}$
`\overleftharpoon`{*argument*} `\overrightharpoon`{*argument*} `\overlrharpoon`{*argument*}	$a + b$ $a + b$ $a + b$	$a + b + c$ $a + b + c$ $a + b + c$	$a + b + x + y$ $a + b + x + y$ $a + b + x + y$

Table 13: Relations and negated binary relations 1

`\therefore`	*a* \ *b*
`\because`	*a* *b*
`\Proportion`	*a* *b*
`\neq`	*a* „ *b*
`\dotequal`	*a* U *b*
`\nasymp`	*a* _ *b*
`\nequiv`	*a* T *b*
`\nsupseteq`	*a* *b*
`\nsubseteq`	*a* *b*
`\nsqsupseteq`	*a* o *b*
`\nsqsubseteq`	*a* *b*
`\nleq`	*a* h *b*
`\ngeq`	*a* x *b*
`\npreceq`	*a* *b*
`\nsucceq`	*a* *b*
`\nsim`	*a* L *b*
`\cong`	*a* @ *b*
`\ncong`	*a* = *b*
`\napprox`	*a* M *b*
`\nsubset`	*a* ¸ *b*
`\nsupset`	*a* *b*
`\nll`	*a* f *b*
`\ngg`	*a* v *b*
`\nprec`	*a* *b*
`\nsucc`	*a* *b*
`\nin`	*a* ˇ *b*
`\nni`	*a* *b*
`\nless`	*a* e *b*
`\ngtr`	*a* u *b*
`\bumpeq`	*a* P *b*
`\Bumpeq`	*a* Q *b*
`\nbumpeq`	*a* R *b*
`\nBumpeq`	*a* S *b*

Table 14: Relations and negated binary relations 2

\unlhd	*a* 1 *b*
\unrhd	*a* A *b*
\nunlhd	*a* D *b*
\nunrhd	*a* 4 *b*
\backepsilon	*a* ' *b*
\TildeEqual	*a* > *b*
\NotTildeEqual	*a* N *b*
\NestedLessLess	*a* a *b*
\NotNestedLessLess	*a* g *b*
\NestedGreaterGreater	*a* q *b*
\NotNestedGreaterGreater	*a* w *b*
\GreaterLess	*a* *b*
\NotGreaterLess	*a* *b*
\GreaterTilde	*a* t *b*
\LessTilde	*a* d *b*
\NotGreaterTilde	*a* { *b*
\NotLessTilde	*a* k *b*
\PrecedesSlantEqual	*a* *b*
\SucceedsSlantEqual	*a* *b*
\NotPrecedesSlantEqual	*a* *b*
\NotSucceedsSlantEqual	*a* *b*
\PrecedesTilde	*a* *b*
\SucceedsTilde	*a* *b*
\NotPrecedesTilde	*a* *b*
\NotSucceedsTilde	*a* *b*
\RightTriangle	*a* @ *b*
\LeftTriangle	*a* 0 *b*
\NotRightTriangle	*a* C *b*
\NotLeftTriangle	*a* 3 *b*
\RightTriangleBar	*a* B *b*
\LeftTriangleBar	*a* 2 *b*
\NotRightTriangleBar	*a* E *b*
\NotLeftTriangleBar	*a* 5 *b*

Table 15: Angle

Name	Alias	normal	bold
\Angle	\angle	–	**—**
\rightangle	\RightAngle	‹	**‹**
\measuredangle	\MeasuredAngle	›	**›**
\sphericalangle	\SphericalAngle	fi	**fi**

Table 16: Text symbols, the text symbols are all defined with a closing \xspace.

\MathLogo		\MathIcon	
\KernelIcon		\Wolf	
\WatchIcon		\LightBulb	
\HappySmiley		\NeutralSmiley	˝
\SadSmiley	¿	\FreakedSmiley	ˇ
\WaringSign		\AliasDelimiter	
\CommandKey	Æ	\ControlKey	
\AltKey		\ModeOneKey	ø
\ModeTwoKey	œ	\CloverLeaf	
\ReturnIndicator	¿	\DottedSquare	
\LeftModfied	◦	\RightModfied	
\EscapeKey		\ReturnKey	
\ShiftKey	Ł	\SpaceKey	Ø
\BackspaceKey	!	\HomeKey	"
\PageUpKey	#	\PageDownKey	$
\EndKey	%	\TabKey	Œ
\DownQuestion	¿		

Table 17: Symbols that exists in math and in text mode.

\SpaceIndicator		
\RoundSpaceIndicator		
\Continuation		
\ErrorIndicator		
\UnknownGlyph		
\SelectionPlaceholder		
\Placeholder		
\SixPointedStar		
\Rectangle		
\GrayRectangle		
\EmptyRectangle	æ	æ
\Square		
\GraySquare		
\EmptySquare	Æ	Æ
\Circle		
\GrayCircle		
\EmptyCircle		
\Ellipsis	…	…
\CenterEllipsis		
\VerticalEllipsis	¶	¶
\AscendingEllipsis	•	•
\DescendingEllipsis	,	,

B Bug Reports

I have still some free positions in the virtual fonts. All users are asked to contribute requests for symbols from the PostScript fonts that are missed in the TEX fonts.

The virtual fonts (spacing, italic correction, placement of super- and subscripts, ...) as well as the style file `mmasym.sty` may still have some errors. Please report this errors via e-mail to:

`kuska@osf1.mpae.gwdg.de`

Please start the subject with the string `MMA Font Bug` and attatch a LATEX 2¶ file that shows the error. I will try to fix the errors as soon as posible.

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