Using the CM Bright typeface with \LaTeX

Walter Schmidt∗

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1 The CM Bright fonts

‘Computer Modern Bright’ is a sans serif typeface family, based on Donald Knuth’s ‘Computer Modern’. It comprises OT1, T1 and TS1 encoded text fonts of various shapes as well as all the fonts necessary for mathematical typesetting, including the AMS symbols.

CM Bright has been designed as a well legible standalone font. It is ‘lighter’ and less obtrusive than CM Sans Serif, which, in contrast, is more appropriate for markup purposes within a CM Roman environment.

Together with CM Bright there comes a family of typewriter fonts, named ‘CM Typewriter Light’, which look better in combination with CM Bright than the ordinary catt fonts would do.

The present document is typeset using the CM Bright and CM Typewriter Light typefaces. Samples of mathematical formulas are provided in section 4.

2 The macro package ‘cmbright’

2.1 Basics

The macro package cmbright supports the use of the typeface family CM Bright with \LaTeX: Loading the package

\usepackage{cmbright}

effects the following:

• The default sans serif font family for typesetting text and math is changed to cmbr (CM Bright).

• The sans serif font family is made the default one for the whole document.

• The packages amsfonts or amssymb, when loaded additionally, will use the ‘CM Bright’ versions of the AMS symbol fonts.

• The default typewriter font family is changed to cmql (CM Typewriter Light).

∗w-a-schmidt@gmx.net
2.2 Line spacing

Because of the large x-height of the CM Bright typeface, it is often necessary to enlarge the line spacing, as compared with the default setting of the standard \TeX document classes. By default, the package cmbright increases the line spacing (\baselineskip) for the font sizes 8–12 pt to approx. 1.25 times size. However, this behavior may cause obscure problems, particularly in conjunction with other macro packages or with ‘moving arguments’. Furthermore, in narrow columns no changes to the default line spacing may be necessary at all.

To stop the package from altering the line spacing, it can be loaded with the option standard-baselineskips. You may still influence the line spacing yourself, for instance, by using the command \linespread{...} in the preamble.

2.3 Greek letters in math mode

When the macro package is loaded using the option slantedGreek, uppercase Greek letters in math mode will, by default, be slanted. Regardless of the option, the new commands $\upGamma$, $\upDelta$ ... $\upOmega$ provide upright uppercase Greek letters: $\Gamma$, $\Delta$ ... $\Omega$ still.

2.4 Bold type in math mode

A new mathematical alphabet \texttt{mathbold} provides bold slanted letters, including uppercase and lowercase Greek. Emboldening of complete formulas through the command \texttt{mathversion} is, however, not possible, because there is no comprehensive set of bold math fonts.

2.5 Scaling of the ‘large’ math symbols

In order to achieve proper scaling of the ‘large’ math symbols, it is recommended to load the standard package \texttt{exscale} in addition to \texttt{cmbright}. This is redundant, if you are using the package \texttt{amsmath}, which includes the required functionality, too.

3 NFSS classification of the fonts

Table 1 lists the font series and shapes available in the CM Bright and CM Typewriter Light families. Notice, that

- the bx series of the text fonts is available with sizes of 9 pt and above only;
- there is no special CM Bright font for the ‘extensible math symbols’, so that OMX/cmex is used instead;
- the font definitions for the AMS fonts are part of the package \texttt{cmbright}; there are no separate \texttt{.fd} files for them.
Table 1: NFSS classification of the fonts

<table>
<thead>
<tr>
<th>encoding</th>
<th>family</th>
<th>series</th>
<th>shape(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CM Bright</td>
<td>cmbr</td>
<td>m</td>
<td>n, sl</td>
</tr>
<tr>
<td>OT1, T1, TS1</td>
<td>cmbr</td>
<td>sb</td>
<td>n, sl</td>
</tr>
<tr>
<td>T1, TS1</td>
<td>cmbr</td>
<td>bx</td>
<td>n</td>
</tr>
<tr>
<td>OT1, T1, TS1</td>
<td>cmbrm</td>
<td>m, b</td>
<td>it</td>
</tr>
<tr>
<td>OML</td>
<td>cmbrm</td>
<td>m</td>
<td>n</td>
</tr>
<tr>
<td>OMS</td>
<td>cmbrs</td>
<td>m</td>
<td>n</td>
</tr>
<tr>
<td>CM Bright AMS A, B</td>
<td>msa, msb</td>
<td>m</td>
<td>n</td>
</tr>
</tbody>
</table>

4 Sample Formulas

From the METAFONT book, p. 298

[...] If \( n > 2 \), the identity

\[
t[u_1, \ldots, u_n] = t[t[u_1, \ldots, u_n], t[u_2, \ldots, u_n]]
\]

defines \( t[u_1, \ldots, u_n] \) recursively, and it can be shown that the alternative definition

\[
t[u_1, \ldots, u_n] = t[t[u_1, u_2], \ldots, t[u_{n-1}, u_n]]
\]

gives the same result. Indeed, we have

\[
t[u_1, \ldots, u_n] = \sum_{k=1}^{n} \binom{n-1}{k-1} (1-t)^{n-k} t^{k-1} u_k,
\]

a Bernstein polynomial of order \( n - 1 \).

From the METAFONT book, p. 59

\[
\frac{x_1 + 20}{x_2 - 20} + \sqrt{a^2 - \frac{2}{3} \sqrt{b}}
\]

From the \TeX{} book, exercise 19.13

\[
\int_{-\infty}^{+\infty} e^{-x^2} \, dx = \sqrt{\pi}
\]
5 The package code

We require a sufficiently recent \LaTeX.
1 \langle∗package⟩
\NeedsTeXFormat{LaTeX2e}[1995/06/01]

5.1 Text font families

The sans serif font family is made the default one:
3 \renewcommand\familydefault{\sfdefault}
CM Bright is to be used as the default sans serif font family:
4 \renewcommand{\sfdefault}{cmbr}
CM Typewriter Light is to be used as the default typewriter font family, because the CM Typewriter fonts look too dark in combination with CM Bright:
5 \renewcommand{\ttdefault}{cmtl}

5.2 Mathematical fonts

Default definitions which remain unchanged are commented out:
6 \DeclareSymbolFont{operators}{OT1}{cmbr}{m}{n}
7 \DeclareSymbolFont{letters}{OML}{cmbrm}{m}{it}
8 \SetSymbolFont{letters}{bold}{OML}{cmbrm}{b}{it}
9 \DeclareSymbolFont{symbols}{OMS}{cmbrs}{m}{n}
% \DeclareSymbolFont{largesymbols}{OMX}{cmex}{m}{n}
% \DeclareSymbolFontAlphabet{\mathrm}{operators}
% \DeclareSymbolFontAlphabet{\mathnormal}{letters}
% \DeclareSymbolFontAlphabet{\mathcal}{symbols}
10 \DeclareMathAlphabet{\mathit}{OT1}{cmbr}{m}{sl}
11 \DeclareMathAlphabet{\mathbf}{OT1}{cmbr}{bx}{n}
12 \DeclareMathAlphabet{\mathtt}{OT1}{cmtl}{m}{n}

Despite its name, \mathrm is not a font with serifs, but it is, what the user expects it to be: the upright font used, e.g., for operator names.

We make a bold slanted mathematical alphabet available:
13 \DeclareMathAlphabet{\mathbold}{OML}{cmbrm}{b}{it}
14 \DeclareMathSymbol{\alpha}{\mathalpha}{letters}{11}
15 \DeclareMathSymbol{\beta}{\mathalpha}{letters}{12}
16 \DeclareMathSymbol{\gamma}{\mathalpha}{letters}{13}
17 \DeclareMathSymbol{\delta}{\mathalpha}{letters}{14}
18 \DeclareMathSymbol{\epsilon}{\mathalpha}{letters}{15}
19 \DeclareMathSymbol{\zeta}{\mathalpha}{letters}{16}
20 \DeclareMathSymbol{\eta}{\mathalpha}{letters}{17}
21 \DeclareMathSymbol{\theta}{\mathalpha}{letters}{18}
22 \DeclareMathSymbol{\iota}{\mathalpha}{letters}{19}
23 \DeclareMathSymbol{\kappa}{\mathalpha}{letters}{20}
24 \DeclareMathSymbol{\lambda}{\mathalpha}{letters}{21}
25 \DeclareMathSymbol{\mu}{\mathalpha}{letters}{22}
26 \DeclareMathSymbol{\nu}{\mathalpha}{letters}{23}
The slantedGreek option:

The \baselineskip should be larger than with CM Roman. For text sizes, i.e., 8–12 pt, a value of 1.25 \times size is recommended. In order to overwrite the \baselineskip defined in the commands like \normalsize, \small, etc., we use a trick from Frank Jensen’s package beton (v1.3). First we set up a table containing our \baselineskip values:

5.3 Leading

The \baselineskip should be larger than with CM Roman. For text sizes, i.e., 8–12 pt, a value of 1.25 \times size is recommended. In order to overwrite the \baselineskip defined in the commands like \normalsize, \small, etc., we use a trick from Frank Jensen’s package beton (v1.3). First we set up a table containing our \baselineskip values:
All the standard \LaTeX size-changing commands are defined in terms of the \setfontsize macro. This macro is called with the following three arguments: \#1 is the size-changing command; \#2 is the font size; \#3 is the \baselineskip value. We modify this macro to check the above \bright@baselineskip@table for an alternative \baselineskip value:

```latex
\def\bright@setfontsize#1#2#3{% 
  \edef\@tempa{\def\noexpand\@tempb####1<#2}%
  \@tempa>##2<##3\@nil{\def\bright@baselineskip@value{##2}}%
  \edef\@tempa{\noexpand\@tempb\bright@baselineskip@table<#2}%
  \@tempa><\@nil
  \ifx\bright@baselineskip@value\@empty
    \def\bright@baselineskip@value{#3}%
  \fi
  \old@setfontsize{#1}{#2}\bright@baselineskip@value}
```

Finally, we save the default meaning of \setfontsize...

```latex
\let\old@setfontsize=\setfontsize
```

... and declare an option to set up the enlarged line space:

```latex
\DeclareOption{enlarged-baselineskips}{{% 
  \let\@setfontsize=\bright@setfontsize}
```

The \baselineskip values specified in the above table should be appropriate for most purposes, i.e., for one-column material in the normal article/report/book formats. However, it is sometimes desirable to turn off the above automatic mechanism:

```latex
\DeclareOption{standard-baselineskips}{{% 
  \let\@setfontsize=\old@setfontsize}
```

### 5.4 Missing symbols

The OT1 encoded CM Bright fonts do not contain the symbol £. We must therefore redefine the commands \textsterling and \mathsterling, so that they use the roman text font family:

```latex
\DeclareTextCommand{\textsterling}{OT1}{{% 
  \ifdim \fontdimen\@ne\font >\z@ 
    \fontfamily{rmdefault}\fontshape{it}\selectfont
  \else 
    \fontfamily{rmdefault}\fontshape{ui}\selectfont
  \fi
  \char'\$}}
```

The following is not entirely correct, because the size will be wrong in superior or subscripts:

```latex
\def\mathsterling{\textsl{\textsterling}}
```

### 5.5 Declaring the AMS symbol fonts

In case the package amsfonts is loaded additionally, the CM Bright versions of the AMS symbol fonts are to be used. The amsfonts package, when loaded with the [psamsfonts] option, will issue its own font definition commands, so
we have to defer ours after loading of the packages, so as not to let them be overwritten.

\AtBeginDocument{\%
\DeclareFontFamily{U}{msa}{}
\DeclareFontShape{U}{msa}{m}{n}{<-9>cmbras8%
<9-10>cmbras9%
<10->cmbras10%}
\}
\DeclareFontFamily{U}{msb}{}
\DeclareFontShape{U}{msb}{m}{n}{<-9>cmbrbs8%
<9-10>cmbrbs9%
<10->cmbrbs10%}
\}

5.6 Logos

The definitions of the \TeX{} and \LaTeX{} logos must be adapted to work with the CM Bright fonts:
\def\TeX{T\kern-.19em\lower.5ex\hbox{E}\kern-.05emX}\%
\DeclareRobustCommand{\LaTeX}{L\kern-.3em\%
\sbox\z@ T\%
\vbox to\ht\z@{\hbox{\check@mathfonts
\fontsize\sf@size\z@\math@fontsfalse\selectfont
A}\%
\vss}\%
\kern-.15em%
\TeX}
\DeclareRobustCommand{\LaTeXe}{\mbox{\m@th
\if b\expandafter\@car\f@series\@nil\boldmath\fi
\LaTeX\kern.15em2$_\varepsilon$}}

5.7 Processing the options
\ExecuteOptions{enlarged-baselineskips}
\ProcessOptions\relax

5.8 Initialization

We ensure that any package loaded after cmbright will find the (possibly) changed value of the line space, as well as the changed default font.
\normalfont\normalsize
⟨/package⟩

6 The font definition files

6.1 CM Bright, OT1 encoding
6.2 CM Bright, T1 encoding
6.3 CM Typewriter Light, OT1 encoding

6.4 CM Typewriter Light, T1 encoding

6.5 CM Bright Math Inclined, OML encoding

6.6 CM Bright Symbols, OMS encoding
We need this for some special tex symbols which may be taken from the
'math italic' font.

We need this for some special text symbols which may be taken from the
mathematical symbol font.

We need this for some special text symbols which may be taken from the
TS1 encoding.
\DeclareFontShape{TS1}{cmbr}{sb}{it}{<->ssub*cmbr/sb/sl}{}
\DeclareFontShape{TS1}{cmbr}{b}{n}{<->ssub*cmbr/bx/n}{}
\DeclareFontShape{TS1}{cmbr}{bx}{n}{<->tbbx10}{}
\DeclareFontShape{TS1}{cmtl}{m}{n}{<->tbtl10}%
\DeclareFontShape{TS1}{cmtl}{m}{sl}{<->tbto10}%
\DeclareFontShape{TS1}{cmtl}{m}{it}{<->ssub*cmtl/m/sl}{}
\DeclareFontShape{T1}{cmtl}{m}{n}{{
\hyphenchar\font\m@ne}
\DeclareFontShape{T1}{cmtl}{m}{n}{<->tbbt10}{}
\DeclareFontShape{T1}{cmtl}{m}{sl}{<->tbbto10}{}
\DeclareFontShape{T1}{cmtl}{m}{it}{<->ssub*cmtl/m/sl}{}
\endinput

6.10 CM Typewriter Light, TS1 encoding

The next line of code prevents DocStrip from adding the character table to all modules:
\endinput