## A first look at the TEX Gyre fonts

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Most LATEX documents look alike. The authors of such documents may respond to this observation with: the software is a tool that is adjunct to their work and so they just do what worked last time.

But for you, wouldn't it be nice to make your paper stand out, in a good way? One approach to that is to use different fonts. Recently a new set of fonts have been developed that are easy for TEX users and although they are still under development, they are nonetheless very handy today.

Besides that these fonts look good and have desirable technical properties, they are great because you will not need to do tricky incantations or to install additional materials. If you have a recent TEX distribution then you only need to add one line to your source file.

### 1 Background

In 1985, Steve Jobs persuaded Adobe to adapt their page description language PostScript for the first LaserWriter. Soon PostScript was so popular that authors could distribute a document in this format, trusting that recipients had a suitable printer or could view it onscreen. This was great for TEX users because there was no more need to compile the document for a particular printer model.

Adobe specified a set of ten font families that any PostScript printer must have (a family of fonts may contain boldface, italic, etc.). So these ten have become widely known and used.

Besides these ten, there are today thousands of fonts available, either commercially or for free. (In the past, fonts came in two formats, Type 1 and TrueType, but there is now a standard, OpenType, that should soon be the single format for all fonts.)

### 2 Gyre

So why do TEX users need new fonts when many thousands are available?

Not many available fonts include characters for all European languages (TEX can add accents and other marks but the mechanism is annoying and interferes with hyphenation) and not many are high quality, including the work needed to make the characters display correctly over a wide range of sizes. Of the fonts satisfying those criteria, very few are suitable for use with mathematics. And of these, very few indeed are Free.

Hans Hagen, well-known in the TEX community as the inventor of ConTEXt, initiated the Gyre project to provide such a set of fonts. The execution team comes from the Polish TEX users group GUST and includes Bogusław Jackowski, Janusz M. Nowacki, and Marcin Woliński. The team's designs trace their lineage to the Adobe standard ten (the descent runs through clone fonts made freely available by URW++). Thus, these are familiar and tested designs that fit the needs of many users.

*Tout le monde dans la province de Candahar connaît l'aventure du jeune Rustan. Il était fils unique d'un mirza du pays; c'est comme qui dirait marquis parmi nous, ou baron chez les Allemands. Le mirza, son père, avait un bien honnête. On devait marier le jeune Rustan à une demoiselle, ou mirzasse de sa sorte. Les deux familles le désiraient passionnément. Il devait faire la consolation de ses parents, rendre sa femme heureuse, et l'être avec elle.*

**Figure 1**: Gyre Chorus

To transform the existing designs into fonts that are optimal for TEX, the team went through a complex sequence of steps; see the papers on the Gyre web page [2]. This included adding characters with accents and other diacritic marks to cover all European languages. This also includs adding the mathematical symbols that TEX users expect.

The team is now making the fonts as usable with mathematics as are Knuth's original fonts; for instance, they are adjusting the spacing between characters and subscripts. But you can nonetheless start using these fonts today in documents that have mathematics, by using packages intended to work with the Adobe fonts.

### 3 Choices

Two of Adobe's standard ten, Symbol and Zapf Dingbats, are not text fonts and so Gyre does not include extensions of them. This table gives the remaining eight with their Gyre equivalents.

| Adobe name | Gyre name |
|---:|---|
| Zapf Chancery | Chorus |
| Courier | Cursor |
| Helvetica | Heros |
| Avant Garde | Adventor |
| Bookman | Bonum |
| New Century Schoolbook | Schola |
| Times | Termes |
| Palatino | Pagella |

A sample of the first in that table, Chorus, is shown in Figure 1, which is produced by this source (from [5]).

```
\documentclass{article}
\usepackage{tgchorus}

\usepackage{ucs} % Unicode support
\usepackage[utf8x]{inputenc}
\usepackage[T1]{fontenc}
\usepackage[french]{babel}
```

| $x$ | sin | tan | cot | cos |
|---|---|---|---|---|
| .00 | .00000 | .00000 | ∞ | 1.00000 |
| .01 | .01000 | .01000 | 99.997 | 0.99995 |
| .02 | .02000 | .02000 | 49.993 | .99980 |
| .03 | .03000 | .03001 | 33.323 | .99955 |

**Figure 2**: Gyre Cursor used for a table

```
\pagestyle{empty}
\begin{document}\thispagestyle{empty}
Tout le monde dans la province de Candahar
connaît l'aventure du jeune Rustan.
...
rendre sa femme heureuse, et l'être avec elle.
\end{document}
```

Note the lack of backslashes in the text, that is, the French author can write in French. Note also that the one line `\usepackage{tgchorus}` is all that we need to use Gyre Chorus in this non-mathematical document. While Chorus is a text font, the sample shows that it is specialized for things like wedding invitations, and is not suitable for a typical TEX document.

The table's second entry, Cursor, is also specialized; see Figure 2 (from [1]); the column headers are from a different font. This font is monospaced — the digits have equal widths — so it is useful for showing a table of numbers or a computer code listing. However, a TEX author wouldn't use it for a main body font.

Our focus is on trying Gyre in documents with mathematics so we will not further discuss these two.

## 4 Math font options

There are some packages of TEX fonts that were designed to provide mathematics capabilities to supplement one or more of the Adobe text fonts. We can use these with the Gyre fonts.

Young Ryu's `pxfonts` matches Adobe Palatino and Gyre Pagella, and provides all of the symbols of the Computer Modern and AMS fonts. The `txfonts` package does the same for Adobe Times and Gyre Termes. (The LATEX packages `qpxmath` and `qtxmath` use the math from these two but leave the text font unchanged, so you can load the text and math font in either order.)

Diego Puga's `mathpazo` is a set of PostScript fonts for typesetting mathematics in combination with Adobe Palatino or Gyre Pagella. The fonts include the uppercase Greek alphabet in upright and slanted shapes in regular and bold weights, lowercase Greek alphabet in slanted shape in regular and bold weights, several mathematical glyphs in regular and bold weights, and some others. The set also includes true small-caps fonts.

The `mathptmx` package changes the main font to Times, and for math uses Times Italic, Computer Modern, Ralph Smith's Formal Script, and Adobe Symbol.

Christophe Caignaert's package `kpfonts` shares its heritage with Gyre Pagella, and among other things includes all the symbols from the AMS fonts.

## 5 Sans serif fonts

In the table relating Adobe's standard fonts to the Gyre fonts, the next two, Heros and Adventor, are sans serif fonts. (A serif is a stroke at the ends of some characters. In these two examples: A and A, the first has small horizontal strokes at the bottom. Those are serifs. The second one is sans serif.)

Sans serif fonts are typically used more for presentations or short work than for long or intricate technical material. But TEX users certainly often use sans serif fonts, and there are several combinations that are quite suitable. See Figure 3.

## 6 Serif fonts

Serif fonts are the ones typically used by TEX authors. In Gyre these are Bonum, Schola, Termes, and Pagella.

Starting with Figure 5 (adapted from [4]), there are a number of combinations that you may find suitable for your document. (In addition to the math font packages described above, one of the figures uses the Euler font.)

## 7 Closing

Work is continuing at a steady pace on the Gyre fonts. When they appear, their math support should be excellent. But you don't have to wait to have a first look. Of the combinations shown above, Gyre Termes with `qtxmath`, Gyre Pagella with `qpxmath`, and Gyre Pagella with `eulervm` seem particularly worth a try. (For even more options, see [3].)

## References


[1] *CRC Standard Mathematics Tables*. W Beyer, ed, 24ed, CRC Press, 1976. p 209.

[2] *The TEX Gyre (TG) Collection of Fonts*. GUST. `http://www.gust.org.pl/projects/e-foundry/tex-gyre/`

[3] *A Survey of Free Math Fonts*. S Hartke. `http://mirror.ctan.org/info/Free_Math_Font_Survey/survey.html`

[4] *Infinite Sequences and Series*. K Knopp, Dover, 1956. p 78.

[5] *Le Blanc et le Noir*. Voltaire, 1764, p 1. `http://www.gutenberg.org/dirs/etext03/betn810.txt`



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If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s+t$ and $s-t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s + t$ and $s - t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 3**: Gyre Heros with Computer Modern math `\usepackage{tgheros}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

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$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s+t$ and $s-t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 4**: Gyre Adventor with `txfonts` math `\usepackage{kmath,tgadventor}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s + t$ and $s - t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s + t$ and $s - t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 5**: Gyre Bonum with `txfonts` for math `\usepackage{kmath,tgbonum}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s+t$ and $s-t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s+t$ and $s-t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 6**: Gyre Schola with Fourier math `\usepackage{fouriernc,tgschola}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s+t$ and $s-t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s+t$ and $s-t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 7**: Gyre Termes with `qtx` math `\usepackage{qtxmath,tgtermes}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s+t$ and $s-t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s+t$ and $s-t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 8**: Gyre Termes with `ptx` math `\usepackage{ptxmath,tgtermes}`

If $\sum a$ and $\sum b$ are convergent series with the respective values s and t, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values s+t and s−t. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s + t$ and $s - t$. Finally, if c is an arbitrary number then $\sum ca_v$ is also convergent and has the value cs.

**Figure 9**: Gyre Pagella with Euler math `\usepackage{eulervm,tgpagella}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s+t$ and $s-t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s + t$ and $s - t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 10**: Gyre Pagella with qpx math `\usepackage{qpxmath,tgpagella}`

If $\sum a$ and $\sum b$ are convergent series with the respective values $s$ and $t$, then the series

$$\sum(a_v + b_v) \quad \text{and} \quad \sum(a_v - b_v)$$

are also convergent and have the respective values $s + t$ and $s - t$. Likewise, the series

$$a_0 + b_0 + a_1 + b_1 + \ldots \quad \text{and} \quad a_0 - b_0 + a_1 - b_1 + \ldots$$

resulting from the removal of the parentheses, are convergent with respective values $s + t$ and $s - t$. Finally, if $c$ is an arbitrary number then $\sum ca_v$ is also convergent and has the value $cs$.

**Figure 11**: Gyre Pagella with pazo math `\usepackage{mathpazo,tgpagella}`