The GFSDIDOT font family

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28 January 2006

1 Introduction

The Didot family of the Greek Font Society was made available for free in autumn 2005. This font existed with a commercial license for many years before. Support for LaTeX and the babel package was prepared several years ago by the author and I. Vasilogiorgakis. With the free availability of the fonts I have modified the original package so that it reflects the changes occured in the latest releases by GFS.

The package supports three encodings: OT1, T1 and LGR to the extend that the font themselves cover these. OT1 and LGR should be fairly complete. The greek part is to be used with the greek option of the Babel package.

The fonts are loaded with
`\usepackage{gfsdidot}`.

The fonts as released contain an italic version, but its greek part is just the roman in slanted form. To overcome this problem for the greek part, we use for italic another font by GFS called Olga. As far as the latin part is concerned the italic characters are taken from Didot-Italic (Olga contains no latin characters). The package provides also a matching small caps shape for both latin and greek including old style numbers.

Finally, the math symbols are taken from the pxfonts package except of course the characters that are already provided by Didot and Olga. The choice of pxfonts was made on the basis that the latin part of Didot is based on Palatino. Moreover, all Didot characters are scaled in the `.fd` files by a factor of 1.04 in order to match the x-height of pxfonts.

2 Installation

Copy the contents of the subdirectory afm in texmf/fonts/afm/GFS/Didot/

Copy the contents of the subdirectory doc in texmf/doc/latex/GFS/Didot/

Copy the contents of the subdirectory enc in texmf/fonts/enc/dvips/GFS/Didot/

Copy the contents of the subdirectory map in texmf/fonts/map/dvips/GFS/Didot/

Copy the contents of the subdirectory tex in texmf/tex/latex/GFS/Didot/

Copy the contents of the subdirectory tfm in texmf/fonts/tfm/GFS/Didot/

Copy the contents of the subdirectory type1 in texmf/fonts/type1/GFS/Didot/

Copy the contents of the subdirectory vf in texmf/fonts/vf/GFS/Didot/

In your installations updmap.cfg file add the line

Map gfsdidot.map

Refresh your filename database and the map file database (for example, on Unix systems run mktexlsr and then run the updmap script as root).

You are now ready to use the fonts provided that you have a relatively modern installation that includes pxfonts.

3 Usage

As said in the introduction the package covers both english and greek. Greek covers polytonic too through babel (read the documentation of the babel package and its greek option).

For example, the preample

```
\documentclass{article}
\usepackage[english,greek]{babel}
\usepackage[iso-8859-7]{inputenc}
\usepackage{gfsdidot}
```

will be the correct setup for articles in Greek.

3.1 Transformations by `dvips`

Other than the shapes provided by the fonts themselves, this package provides an upright italic shape and a slanted small caps shape using the standard mechanism provided by dvips. Upright italics are called with `\uishape` and slanted small caps with `\scslshape`. For example, the code

```
{\itshape italics {\uishape upright italics} {\itshape italics again}
\textgreek{{\itshape >'abgdzxfy‘w| {\uishape >'abgdzxfy‘w|} {\itshape >'abgdzxfy‘w|}}}}

\textsc{small caps \textgreek{pezokefala'ia} 0123456789} {\scslshape
  \textgreek{pezokefala'ia 0123456789}}
```

will give

italics upright italics *italics again* *ἄβγδζξφψῷ* ἄβγδζξφψῷ *ἄβγδζξφψῷ*

SMALL CAPS ΠΕΖΟΚΕΦΑΛΑΙΑ 0123456789 *ΠΕΖΟΚΕΦΑΛΑΙΑ 0123456789*

The commands `\textui{}` and `\textscsl{}` are also provided.

3.2 Tabular numbers

Tabular numbers (of fixed width) are accessed with the command `\tabnums{}`. Compare

`|0|1|2|3|4|5|6|7|8|9|`	|0|1|2|3|4|5|6|7|8|9|
`\tabnums{|0|1|2|3|4|5|6|7|8|9|}`	|0|1|2|3|4|5|6|7|8|9|

3.3 Text fractions

Text fractions are composed using the lower and upper numerals provided by the fonts, and are accessed with the command `\textfrac{}{}`. For example, `\textfrac{-22}{7}` gives ⁻²²⁄₇.

Precomposed fractions are provided too by `\onehalf`, `\onethird`, etc.

3.4 Additional characters

`\textbullet`	•
`\textparagraph`	¶
`\textparagraphalt`	⁋
`\careof`	℅
`\numero`	№
`\estimated`	℮
`\whitebullet`	◦
`\textlozenge`	◊
`\eurocurrency`	€
`\interrobang`	‽
`\textdagger`	†
`\textdaggerdbl`	‡
`\yencurrency`	¥

Euro is also available in LGR enconding. `\textgreek{\euro}` gives €.

3.5 Alternate characters

In the greek encoding the initial theta is chosen automatically. Compare: ϑάλασσα but Αθηνά. Other alternate characters are not chosen automatically.

Olga provides a double lambda: λλ. This can be accessed with the command `\lambdadbl` in textmode.

For example, in LGR encoding

```
\textit{a\lambdadbl'a kat'allhlos metasjhmatism;oc}
```

gives

αλλά κατάλληλος μετασχηματισμός.

4 Problems

The accents of the capital letters should hang in the left margin when such a letter starts a line. TEX and LATEX do not provide the tools for such a feature. However, this seems to be possible with pdfTEX As this is work in progress, please be patient...

5 Samples

The next two pages provide samples in english and greek with math.

Adding up these inequalities with respect to i, we get

$$\sum c_i d_i \leq \frac{1}{p} + \frac{1}{q} = 1 \tag{1}$$

since $\sum c_i^p = \sum d_i^q = 1$. □

In the case $p = q = 2$ the above inequality is also called the *Cauchy-Schwartz inequality*.

Notice, also, that by formally defining $(\sum |b_k|^q)^{1/q}$ to be $\sup |b_k|$ for $q = \infty$, we give sense to (9) for all $1 \leq p \leq \infty$.

A similar inequality is true for functions instead of sequences with the sums being substituted by integrals.

Theorem *Let $1 < p < \infty$ and let q be such that $1/p + 1/q = 1$. Then, for all functions f, g on an interval $[a, b]$ such that the integrals $\int_a^b |f(t)|^p \, dt$, $\int_a^b |g(t)|^q \, dt$ and $\int_a^b |f(t)g(t)| \, dt$ exist (as Riemann integrals), we have*

$$\int_a^b |f(t)g(t)| \, dt \leq \left(\int_a^b |f(t)|^p \, dt \right)^{1/p} \left(\int_a^b |g(t)|^q \, dt \right)^{1/q}. \tag{2}$$

Notice that if the Riemann integral $\int_a^b f(t)g(t) \, dt$ also exists, then from the inequality $\left| \int_a^b f(t)g(t) \, dt \right| \leq \int_a^b |f(t)g(t)| \, dt$ follows that

$$\left| \int_a^b f(t)g(t) \, dt \right| \leq \left(\int_a^b |f(t)|^p \, dt \right)^{1/p} \left(\int_a^b |g(t)|^q \, dt \right)^{1/q}. \tag{3}$$

Proof: Consider a partition of the interval $[a, b]$ in n equal subintervals with endpoints $a = x_0 < x_1 < \cdots < x_n = b$. Let $\Delta x = (b - a)/n$. We have

$$\begin{aligned} \sum_{i=1}^{n} |f(x_i)g(x_i)| \Delta x &\leq \sum_{i=1}^{n} |f(x_i)g(x_i)| (\Delta x)^{\frac{1}{p} + \frac{1}{q}} \\ &= \sum_{i=1}^{n} \left(|f(x_i)|^p \Delta x \right)^{1/p} \left(|g(x_i)|^q \Delta x \right)^{1/q}. \end{aligned} \tag{4}$$

- Εμβαδόν επιφάνειας από περιστροφή

Πρόταση 5.1 *Έστω γ καμπύλη με παραμετρική εξίσωση $x = g(t)$, $y = f(t)$, $t \in [a, b]$ αν g', f' συνεχείς στο $[a, b]$ τότε το εμβαδόν από περιστροφή της γ γύρω από τον xx' δίνεται*
$B = 2\pi \int_a^b |f(t)| \sqrt{g'(t)^2 + f'(t^2)} dt$.
Αν η γ δίνεται από την $y = f(x)$, $x \in [a, b]$ τότε $B = 2\pi \int_a^b |f(t)| \sqrt{1 + f'(x)^2} dx$

- Όγκος στερεών από περιστροφή

Έστω $f : [a, b] \to \mathbb{R}$ συνεχής και $R = \{f, Ox, x = a, x = b\}$ είναι ο όγκος από περιστροφή του γραφήματος της f γύρω από τον Ox μεταξύ των ευθειών $x = a$, και $x = b$, τότε $V = \pi \int_a^b f(x)^2 dx$

- Αν $f, g : [a, b] \to \mathbb{R}$ και $0 \leq g(x) \leq f(x)$ τότε ο όγκος στερεού που παράγεται από περιστροφή των γραφημάτων των f και g, $R = \{f, g, Ox, x = a, x = b\}$ είναι
$V = \pi \int_a^b \{f(x)^2 - g(x)^2\} dx$.
- Αν $x = g(t)$, $y = f(t)$, $t = [t_1, t_2]$ τότε $V = \pi \int_{t_1}^{t_2} \{f(t)^2 g'(t)\} dt$ για $g(t_1) = a$, $g(t_2) = b$.

6 Ασκήσεις

Άσκηση 6.1 *Να εκφραστεί το παρακάτω όριο ως ολοκλήρωμα Riemann κατάλληλης συνάρτησης*

$$\lim_{n\to\infty} \frac{1}{n} \sum_{k=1}^{n} \sqrt[n]{e^k}$$

Υπόδειξη: Πρέπει να σκεφτούμε μια συνάρτηση της οποίας γνωρίζουμε ότι υπάρχει το ολοκλήρωμα. Τότε παίρνουμε μια διαμέριση P_n και δείχνουμε π.χ. ότι το $U(f, P_n)$ είναι η ζητούμενη σειρά.

Λύση: Πρέπει να σκεφτούμε μια συνάρτηση της οποίας γνωρίζουμε ότι υπάρχει το ολοκλήρωμα. Τότε παίρνουμε μια διαμέριση P_n και δείχνουμε π.χ. ότι το $U(f, P_n)$ είναι η ζητούμενη σειρά.
Έχουμε ότι

$$\begin{aligned} \frac{1}{n} \sum_{k=1}^{n} \sqrt[n]{e^k} &= \frac{1}{n} \sqrt[n]{e} + \frac{1}{n} \sqrt[n]{e^2} + \cdots + \frac{1}{n} \sqrt[n]{e^n} \\ &= \frac{1}{n} e^{\frac{1}{n}} + \frac{1}{n} e^{\frac{2}{n}} + \cdots + \frac{1}{n} e^{\frac{n}{n}} \end{aligned}$$