The pxgreeks package

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Abstract

The PX Fonts [1] of Young Ryu provide a very complete replacement for the default math fonts of TEX and LATEX, containing all CM symbols and even all symbols from the $\mathcal{AMS}$ fonts, and more. In particular upright shapes for the Greek letters are available (they are necessary in French mathematical typography). The pxgreeks package[2] allows LATEX users who use the PX fonts to easily select the shapes (italic or upright) for the Greek lowercase and uppercase letters. This is compatible with using arbitrary text fonts in the document.

1 Features

The shape of the Greek letters is decided according to the options passed to the package: `TeX` (=`sloped`, the default: lowercase italic and uppercase upright), `upright` (=`French`=`upgreek`, lowercase and uppercase upright), `ISO` (=`itgreek`, lowercase and uppercase italic), `itGreek` (italic uppercase) and `upGreek` (upright uppercase). Use both of `itGreek` and `upgreek` to get lowercase upright and uppercase italic.

The uppercase Greek letters are not taken from the PX roman font `pxr` ('operators') but from either the alternate math italic font `pxmia` ('lettersA', which in fact provides upright Greek in OML encoding), or from the math italic font `pxmi` ('letters', where uppercase Greek is in italic shape). This means that if some other package redefines the 'operators' font used in math (presumably to coïncide with the 'roman' font used for the document text), this will have no impact on the Greek uppercase letters. If some package modifies the 'letters' font used in math (which typically is the font for Latin letters and lowercase Greek letters, and with `pxgreeks` is also used for the italic uppercase Greek letters), then of course the glyphs will be from the new font. But the upright glyphs will still be from the PX Font `pxmia` ('lettersA').

Following the model of the `fourier` package, the alternative shape of the Greek letters is accessible via the `\other...` prefix: `\otheralpha` will be upright if `\alpha` is italic, and vice versa. For the lowercase Greek letters there are also the macros ending in `up` (`\alphaup`, ...) which are already defined by `pxfonts`.

Regarding the uppercase letters, the package defines (replacing the `amsmath` definitions) `\varGamma`, etc... as synonyms for `\otherGamma`, etc..., but does not define additional macros `\Gammaup` as this was not done by the package `pxfonts`. Use rather `\otherGamma` if necessary.[3]

The package defines `\omicron`, `\otheromicron`, and `\omicronup`. But there is no upright omicron in the `pxmia` font, so we have to use the construct `\mathrm{\omicron}` (this will a priori use the PX roman font `pxr`).

[1] package `http://mirrors.ctan.org/help/Catalogue/entries/pxfonts.html`

[2] This document describes `pxgreeks` version 1.0 (2011/03/16).

[3] contrarily to `amsmath` we define the `\varGamma`, etc... to be of type `\mathalpha` so they obey, like the default LATEX `\Gamma`, etc ... the math alphabet changing commands; however to access the bold glyphs I recommend using either the `\bm` command from the `bm` package or the `\boldsymbol` command from the `amsbsy` package and not `\mathbf` which by default will use the PX roman font `pxr`.

It is not necessary to write `\usepackage{pxfonts}` prior to `\usepackage{pxgreeks}` as this is done by `pxgreeks` itself, but for clarity of the LaTeX source of the document to be typeset, this is highly recommended, as `pxgreeks` does very minor things compared to `pxfonts`.

Using `pxgreeks` should be hopefully compatible with any package which is already compatible with `pxfonts`.

2 Implementation

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{pxgreeks}
[2011/03/16 v1.0 shape selection for the PX fonts Greek letters]
\RequirePackage{pxfonts}
\newif\iftgs@uplower
\newif\iftgs@itupper
\def\tgs@Greek@sh{0}
\DeclareOption{itgreek}{\tgs@uplowerfalse\tgs@ituppertrue}
\DeclareOption{upgreek}{\tgs@uplowertrue\tgs@itupperfalse}
\DeclareOption{itGreek}{\def\tgs@Greek@sh{1}}
\DeclareOption{upGreek}{\def\tgs@Greek@sh{2}}
\DeclareOption{TeX}{\tgs@uplowerfalse\tgs@itupperfalse} %default
\DeclareOption{sloped}{\ExecuteOptions{TeX}}
\DeclareOption{upright}{\ExecuteOptions{upgreek}}
\DeclareOption{French}{\ExecuteOptions{upright}}
\DeclareOption{ISO}{\ExecuteOptions{itgreek}}
\DeclareOption*{\PackageWarning{pxgreeks}{Unknown option `\CurrentOption'}}
\ProcessOptions\relax
\ifcase\tgs@Greek@sh\or\tgs@ituppertrue\or\tgs@itupperfalse\fi
```

macro `\re@DeclareMathSymbol` defined in pxfonts.sty
symbol font lettersA=pxmia defined in pxfonts.sty (contains upright Greek)

```
\re@DeclareMathSymbol{\Gamma}{\mathalpha}{lettersA}{0}
\re@DeclareMathSymbol{\Delta}{\mathalpha}{lettersA}{1}
\re@DeclareMathSymbol{\Theta}{\mathalpha}{lettersA}{2}
\re@DeclareMathSymbol{\Lambda}{\mathalpha}{lettersA}{3}
\re@DeclareMathSymbol{\Xi}{\mathalpha}{lettersA}{4}
\re@DeclareMathSymbol{\Pi}{\mathalpha}{lettersA}{5}
\re@DeclareMathSymbol{\Sigma}{\mathalpha}{lettersA}{6}
\re@DeclareMathSymbol{\Upsilon}{\mathalpha}{lettersA}{7}
\re@DeclareMathSymbol{\Phi}{\mathalpha}{lettersA}{8}
\re@DeclareMathSymbol{\Psi}{\mathalpha}{lettersA}{9}
\re@DeclareMathSymbol{\Omega}{\mathalpha}{lettersA}{10}
```

`\varGamma` etc... defined in amsmath, but with type `\mathord`

```
\re@DeclareMathSymbol{\varGamma}{\mathalpha}{letters}{0}
\re@DeclareMathSymbol{\varDelta}{\mathalpha}{letters}{1}
\re@DeclareMathSymbol{\varTheta}{\mathalpha}{letters}{2}
\re@DeclareMathSymbol{\varLambda}{\mathalpha}{letters}{3}
\re@DeclareMathSymbol{\varXi}{\mathalpha}{letters}{4}
\re@DeclareMathSymbol{\varPi}{\mathalpha}{letters}{5}
\re@DeclareMathSymbol{\varSigma}{\mathalpha}{letters}{6}
\re@DeclareMathSymbol{\varUpsilon}{\mathalpha}{letters}{7}
\re@DeclareMathSymbol{\varPhi}{\mathalpha}{letters}{8}
```

```
\re@DeclareMathSymbol{\varPsi}{\mathalpha}{letters}{9}
\re@DeclareMathSymbol{\varOmega}{\mathalpha}{letters}{10}
\re@DeclareMathSymbol{\omicron}{\mathalpha}{letters}{`o}
```

unfortunately no upright omicron in lettersA=pxmia

```
\let\omicronup\undefined\newcommand{\omicronup}{\mathrm{o}}
\iftgs@uplower % upright lowercase Greek letters
\let\otheralpha\alpha
\let\otherbeta\beta
\let\othergamma\gamma
\let\otherdelta\delta
\let\otherepsilon\epsilon
\let\otherzeta\zeta
\let\othereta\eta
\let\othertheta\theta
\let\otheriota\iota
\let\otherkappa\kappa
\let\otherlambda\lambda
\let\othermu\mu
\let\othernu\nu
\let\otherxi\xi
\let\otherpi\pi
\let\otherrho\rho
\let\othersigma\sigma
\let\othertau\tau
\let\otherupsilon\upsilon
\let\otherphi\phi
\let\otherchi\chi
\let\otherpsi\psi
\let\otheromega\omega
\let\othervarepsilon\varepsilon
\let\othervartheta\vartheta
\let\othervarpi\varpi
\let\othervarrho\varrho
\let\othervarsigma\varsigma
\let\othervarphi\varphi
\let\otheromicron\omicron
%%
\let\alpha\alphaup
\let\beta\betaup
\let\gamma\gammaup
\let\delta\deltaup
\let\epsilon\epsilonup
\let\zeta\zetaup
\let\eta\etaup
\let\theta\thetaup
\let\iota\iotaup
\let\kappa\kappaup
\let\lambda\lambdaup
\let\mu\muup
\let\nu\nuup
\let\xi\xiup
\let\pi\piup
\let\rho\rhoup
```

```
\let\sigma\sigmaup
\let\tau\tauup
\let\upsilon\upsilonup
\let\phi\phiup
\let\chi\chiup
\let\psi\psiup
\let\omega\omegaup
\let\varepsilon\varepsilonup
\let\vartheta\varthetaup
\let\varpi\varpiup
\let\varrho\varrhoup
\let\varsigma\varsigmaup
\let\varphi\varphiup
\let\omicron\omicronup
\else % italic lowercase Greek letters (default)
\let\otheralpha\alphaup
\let\otherbeta\betaup
\let\othergamma\gammaup
\let\otherdelta\deltaup
\let\otherepsilon\epsilonup
\let\otherzeta\zetaup
\let\othereta\etaup
\let\othertheta\thetaup
\let\otheriota\iotaup
\let\otherkappa\kappaup
\let\otherlambda\lambdaup
\let\othermu\muup
\let\othernu\nuup
\let\otherxi\xiup
\let\otherpi\piup
\let\otherrho\rhoup
\let\othersigma\sigmaup
\let\othertau\tauup
\let\otherupsilon\upsilonup
\let\otherphi\phiup
\let\otherchi\chiup
\let\otherpsi\psiup
\let\otheromega\omegaup
\let\othervarepsilon\varepsilonup
\let\othervartheta\varthetaup
\let\othervarpi\varpiup
\let\othervarrho\varrhoup
\let\othervarsigma\varsigmaup
\let\othervarphi\varphiup
\let\otheromicron\omicronup
\fi
%%
\iftgs@itupper % italic uppercase Greek
\let\otherGamma\Gamma
\let\otherDelta\Delta
\let\otherTheta\Theta
\let\otherLambda\Lambda
\let\otherXi\Xi
```

```
\let\otherPi\Pi
\let\otherSigma\Sigma
\let\otherUpsilon\Upsilon
\let\otherPhi\Phi
\let\otherPsi\Psi
\let\otherOmega\Omega
\let\Gamma\varGamma
\let\Delta\varDelta
\let\Theta\varTheta
\let\Lambda\varLambda
\let\Xi\varXi
\let\Pi\varPi
\let\Sigma\varSigma
\let\Upsilon\varUpsilon
\let\Phi\varPhi
\let\Psi\varPsi
\let\Omega\varOmega
\let\varGamma\otherGamma
\let\varDelta\otherDelta
\let\varTheta\otherTheta
\let\varLambda\otherLambda
\let\varXi\otherXi
\let\varPi\otherPi
\let\varSigma\otherSigma
\let\varUpsilon\otherUpsilon
\let\varPhi\otherPhi
\let\varPsi\otherPsi
\let\varOmega\otherOmega
\else % upright uppercase Greek (default)
\let\otherGamma\varGamma
\let\otherDelta\varDelta
\let\otherTheta\varTheta
\let\otherLambda\varLambda
\let\otherXi\varXi
\let\otherPi\varPi
\let\otherSigma\varSigma
\let\otherUpsilon\varUpsilon
\let\otherPhi\varPhi
\let\otherPsi\varPsi
\let\otherOmega\varOmega
\fi
\endinput
```