The `txgreeks` package

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Abstract

The TX 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 `txgreeks` package[2] allows LATEX users who use the TX 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 TX roman font `txr` ('operators') but from either the alternate math italic font `txmia` ('lettersA', which in fact provides upright Greek in OML encoding), or from the math italic font `txmi` ('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 `txgreeks` 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 TX Font `txmia` ('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 `txfonts`.

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 `txfonts`. Use rather `\otherGamma` if necessary.[3]

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

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

[2] This document describes `txgreeks` 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 TX roman font `txr`.

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

Using `txgreeks` should be hopefully compatible with any package which is already compatible with `txfonts`.

2   Implementation

```
1 \NeedsTeXFormat{LaTeX2e}
2 \ProvidesPackage{txgreeks}
3 [2011/03/16 v1.0 shape selection for the TX fonts Greek letters]
4 \RequirePackage{txfonts}
5 \newif\iftgs@uplower
6 \newif\iftgs@itupper
7 \def\tgs@Greek@sh{0}
8 \DeclareOption{itgreek}{\tgs@uplowerfalse\tgs@ituppertrue}
9 \DeclareOption{upgreek}{\tgs@uplowertrue\tgs@itupperfalse}
10 \DeclareOption{itGreek}{\def\tgs@Greek@sh{1}}
11 \DeclareOption{upGreek}{\def\tgs@Greek@sh{2}}
12 \DeclareOption{TeX}{\tgs@uplowerfalse\tgs@itupperfalse} %default
13 \DeclareOption{sloped}{\ExecuteOptions{TeX}}
14 \DeclareOption{upright}{\ExecuteOptions{upgreek}}
15 \DeclareOption{French}{\ExecuteOptions{upright}}
16 \DeclareOption{ISO}{\ExecuteOptions{itgreek}}
17 \DeclareOption*{\PackageWarning{txgreeks}{Unknown option '\CurrentOption'}}
18 \ProcessOptions\relax
19 \ifcase\tgs@Greek@sh\or\tgs@ituppertrue\or\tgs@itupperfalse\fi
```

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

```
20 \re@DeclareMathSymbol{\Gamma}{\mathalpha}{lettersA}{0}
21 \re@DeclareMathSymbol{\Delta}{\mathalpha}{lettersA}{1}
22 \re@DeclareMathSymbol{\Theta}{\mathalpha}{lettersA}{2}
23 \re@DeclareMathSymbol{\Lambda}{\mathalpha}{lettersA}{3}
24 \re@DeclareMathSymbol{\Xi}{\mathalpha}{lettersA}{4}
25 \re@DeclareMathSymbol{\Pi}{\mathalpha}{lettersA}{5}
26 \re@DeclareMathSymbol{\Sigma}{\mathalpha}{lettersA}{6}
27 \re@DeclareMathSymbol{\Upsilon}{\mathalpha}{lettersA}{7}
28 \re@DeclareMathSymbol{\Phi}{\mathalpha}{lettersA}{8}
29 \re@DeclareMathSymbol{\Psi}{\mathalpha}{lettersA}{9}
30 \re@DeclareMathSymbol{\Omega}{\mathalpha}{lettersA}{10}
```

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

```
31 \re@DeclareMathSymbol{\varGamma}{\mathalpha}{letters}{0}
32 \re@DeclareMathSymbol{\varDelta}{\mathalpha}{letters}{1}
33 \re@DeclareMathSymbol{\varTheta}{\mathalpha}{letters}{2}
34 \re@DeclareMathSymbol{\varLambda}{\mathalpha}{letters}{3}
35 \re@DeclareMathSymbol{\varXi}{\mathalpha}{letters}{4}
36 \re@DeclareMathSymbol{\varPi}{\mathalpha}{letters}{5}
37 \re@DeclareMathSymbol{\varSigma}{\mathalpha}{letters}{6}
38 \re@DeclareMathSymbol{\varUpsilon}{\mathalpha}{letters}{7}
39 \re@DeclareMathSymbol{\varPhi}{\mathalpha}{letters}{8}
```

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

unfortunately no upright omicron in lettersA=txmia

```
43 \let\omicronup\undefined\newcommand{\omicronup}{\mathrm{o}}
44 \iftgs@uplower % upright lowercase Greek letters
45 \let\otheralpha\alpha
46 \let\otherbeta\beta
47 \let\othergamma\gamma
48 \let\otherdelta\delta
49 \let\otherepsilon\epsilon
50 \let\otherzeta\zeta
51 \let\othereta\eta
52 \let\othertheta\theta
53 \let\otheriota\iota
54 \let\otherkappa\kappa
55 \let\otherlambda\lambda
56 \let\othermu\mu
57 \let\othernu\nu
58 \let\otherxi\xi
59 \let\otherpi\pi
60 \let\otherrho\rho
61 \let\othersigma\sigma
62 \let\othertau\tau
63 \let\otherupsilon\upsilon
64 \let\otherphi\phi
65 \let\otherchi\chi
66 \let\otherpsi\psi
67 \let\otheromega\omega
68 \let\othervarepsilon\varepsilon
69 \let\othervartheta\vartheta
70 \let\othervarpi\varpi
71 \let\othervarrho\varrho
72 \let\othervarsigma\varsigma
73 \let\othervarphi\varphi
74 \let\otheromicron\omicron
75 %%
76 \let\alpha\alphaup
77 \let\beta\betaup
78 \let\gamma\gammaup
79 \let\delta\deltaup
80 \let\epsilon\epsilonup
81 \let\zeta\zetaup
82 \let\eta\etaup
83 \let\theta\thetaup
84 \let\iota\iotaup
85 \let\kappa\kappaup
86 \let\lambda\lambdaup
87 \let\mu\muup
88 \let\nu\nuup
89 \let\xi\xiup
90 \let\pi\piup
91 \let\rho\rhoup
```

```
 92 \let\sigma\sigmaup
 93 \let\tau\tauup
 94 \let\upsilon\upsilonup
 95 \let\phi\phiup
 96 \let\chi\chiup
 97 \let\psi\psiup
 98 \let\omega\omegaup
 99 \let\varepsilon\varepsilonup
100 \let\vartheta\varthetaup
101 \let\varpi\varpiup
102 \let\varrho\varrhoup
103 \let\varsigma\varsigmaup
104 \let\varphi\varphiup
105 \let\omicron\omicronup
106 \else % italic lowercase Greek letters (default)
107 \let\otheralpha\alphaup
108 \let\otherbeta\betaup
109 \let\othergamma\gammaup
110 \let\otherdelta\deltaup
111 \let\otherepsilon\epsilonup
112 \let\otherzeta\zetaup
113 \let\othereta\etaup
114 \let\othertheta\thetaup
115 \let\otheriota\iotaup
116 \let\otherkappa\kappaup
117 \let\otherlambda\lambdaup
118 \let\othermu\muup
119 \let\othernu\nuup
120 \let\otherxi\xiup
121 \let\otherpi\piup
122 \let\otherrho\rhoup
123 \let\othersigma\sigmaup
124 \let\othertau\tauup
125 \let\otherupsilon\upsilonup
126 \let\otherphi\phiup
127 \let\otherchi\chiup
128 \let\otherpsi\psiup
129 \let\otheromega\omegaup
130 \let\othervarepsilon\varepsilonup
131 \let\othervartheta\varthetaup
132 \let\othervarpi\varpiup
133 \let\othervarrho\varrhoup
134 \let\othervarsigma\varsigmaup
135 \let\othervarphi\varphiup
136 \let\otheromicron\omicronup
137 \fi
138 %%
139 \iftgs@itupper % italic uppercase Greek
140 \let\otherGamma\Gamma
141 \let\otherDelta\Delta
142 \let\otherTheta\Theta
143 \let\otherLambda\Lambda
144 \let\otherXi\Xi
```

```latex
145 \let\otherPi\Pi
146 \let\otherSigma\Sigma
147 \let\otherUpsilon\Upsilon
148 \let\otherPhi\Phi
149 \let\otherPsi\Psi
150 \let\otherOmega\Omega
151 \let\Gamma\varGamma
152 \let\Delta\varDelta
153 \let\Theta\varTheta
154 \let\Lambda\varLambda
155 \let\Xi\varXi
156 \let\Pi\varPi
157 \let\Sigma\varSigma
158 \let\Upsilon\varUpsilon
159 \let\Phi\varPhi
160 \let\Psi\varPsi
161 \let\Omega\varOmega
162 \let\varGamma\otherGamma
163 \let\varDelta\otherDelta
164 \let\varTheta\otherTheta
165 \let\varLambda\otherLambda
166 \let\varXi\otherXi
167 \let\varPi\otherPi
168 \let\varSigma\otherSigma
169 \let\varUpsilon\otherUpsilon
170 \let\varPhi\otherPhi
171 \let\varPsi\otherPsi
172 \let\varOmega\otherOmega
173 \else % upright uppercase Greek (default)
174 \let\otherGamma\varGamma
175 \let\otherDelta\varDelta
176 \let\otherTheta\varTheta
177 \let\otherLambda\varLambda
178 \let\otherXi\varXi
179 \let\otherPi\varPi
180 \let\otherSigma\varSigma
181 \let\otherUpsilon\varUpsilon
182 \let\otherPhi\varPhi
183 \let\otherPsi\varPsi
184 \let\otherOmega\varOmega
185 \fi
186 \endinput
```