The \texttt{lgrmath} package

\textsc{Jean-François Burnol}

\texttt{jfbu (at) free (dot) fr}

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\section{Description}

The \texttt{lgrmath} package sets the Greek letters in math mode \texttt{(only)} to use glyphs from the LGR-encoded font of one’s choice.

Thus \texttt{lgrmath} is for people who want \texttt{only} to adjust Greek letters in math mode (and easily configure usage of upright or italic/slanted shapes), perhaps in the context of having changed Latin letters as well, e.g. from using the \texttt{frenchmath}\footnote{Antoine Missier, \textit{Typesetting mathematics according to French rules}, \url{https://ctan.org/pkg/frenchmath}.} package which makes uppercase Latin letters in math mode render upright, among quite a few other adjustments tailored for French mathematical typesetting, or the \texttt{mathastext}\footnote{Verfasser, \textit{Use the text font in math mode}, \url{https://ctan.org/pkg/mathastext}.} package. Actually \texttt{lgrmath} is in part inspired from this latter package \texttt{LGRgreek} option and \texttt{\MTgreekfont} command. But \texttt{lgrmath} currently does not incorporate a mechanism for defining and using multiple math versions, each one with its own font for Greek letters, as is already provided by \texttt{mathastext}.

The package is also related to \texttt{libgreek}\footnote{Verfasser, \textit{Greek letters in math mode from Libertinus or Linux Libertine/Biolinum}, \url{https://ctan.org/pkg/libgreek}.}, also by the author, and shares most of its codebase, after dropping matters related to \texttt{libgreek-legacy}, and the \texttt{scale} option which can not be implemented generically.
The Greek letters all come with \...up and \...it named variants, and whether “bare” control sequences map to the ‘up’ or ‘it’ ones can be configured via package options, even midway in the document via \lgrmathsetup. Further, the package optionally defines two math alphabets \lgrmathup and \lgrmathit. What ‘up’ and ‘it’ actually mean can be configured using the upshape and itshape keys at package loading time.

2 Options of the lgrmath package

| \Alpha | A | \Nu | N | \alpha | a | \nu | ν |
| \Beta | B | \Xi | Ξ | \beta | β | \xi | ξ |
| \Gamma | Γ | \Omicron | O | \gamma | γ | \omicron | o |
| \Delta | Δ | \Pi | Π | \delta | δ | \pi | π |
| \Epsilon | Ε | P | ρ |
| \Zeta | Z | \Sigma | Σ | \zeta | ζ | \sigma | σ |
| \Eta | H | \Tau | T | \eta | η | \tau | τ |
| \Theta | Θ | \Upsilon | Υ | \theta | θ | \upsilon | υ |
| \Iota | I | \Phi | Φ | \iota | ι | \phi | ϕ |
| \Kappa | K | \Chi | X | \kappa | κ | \chi | χ |
| \Lambda | Λ | \Psi | Ψ | \lambda | λ | \psi | ψ |
| \Mu | M | \Omega | Ω | \mu | μ | \omega | ω |

\varsigma \varsigma \digamma \digamma \varSigma \varSigma \varSigma \varSigma \varsigma \varsigma \koppa \koppa \Sampi \Sampi \Sampi \Sampi \varsigma \varsigma \koppa \koppa \Sampi \Sampi

Table 1: Greek letters, upright shapes, default family

Here are the options recognized by the package:

**font=(font_name)** This specifies which font (font family in the sense of the \LaTeX{} font selection scheme) to use. It defaults to \lrm.

In Table 1 and Table 2 we display the glyphs from this default font \lrm in LGR encoding, available to \LaTeX{} thanks to the support files from the package (in the sense of CTAN or \TeX{}Live, not of a \LaTeX{} document) \texttt{cbfonts-fd}. It is recommended to user to have a look at its documentation \texttt{texdoc cbfonts} in particular the section on Customizations which mentions alternate shapes (such as rs, ro, ii, iv, uv — those last two are actually for sans-serif \texttt{lmss} —, and there are also comments relative to the series) and use appropriately the upshape, itshape, series and boldseries lgrmath keys which are documented next.

\footnote{Claudio Beccari, \LaTeX{} font description files for the CB Greek fonts, \url{https://ctan.org/pkg/cbfonts-fd}.}
| \(\text{\textalpha}\) | \(\alpha\) | \(\text{\textmu}\) | \(\nu\) |
| \(\text{\textbeta}\) | \(\beta\) | \(\xi\) |
| \(\text{\textgamma}\) | \(\gamma\) | \(\omicron\) |
| \(\text{\textdelta}\) | \(\delta\) | \(\pi\) |
| \(\text{\textepsilon}\) | \(\epsilon\) | \(\omicron\) |
| \(\text{\textzeta}\) | \(\zeta\) | \(\sigma\) |
| \(\text{\textiota}\) | \(\iota\) | \(\phi\) |
| \(\text{\textkappa}\) | \(\kappa\) | \(\chi\) |
| \(\text{\textlambda}\) | \(\lambda\) | \(\psi\) |
| \(\text{\textm\textupsigma}\) | \(\varsigma\) | \(\upsilon\) |
| \(\text{\textvarsigma}\) | \(\varSigma\) | \(\Upsilon\) |
| \(\text{\textsampi}\) | \(\varsigma\) | \(\koppa\) |

Table 2: Greek letters, italic shapes, default family

The allowable names \(\langle\text{font\_name}\rangle\)'s are those \texttt{foo} for which a file \texttt{LGRfoo.fd} or \texttt{lgrfoo.fd} exists on the system.

The above remarks about customization apply generally to all fonts, try to see if there is some documentation associated with the font you choose. Ultimate experts will look into the .\texttt{fd} files to see (for example) if there is some interface to rescale the fonts by some factor.

Here is now a list of suitable such font definition files from which you can extract usable font family names. This has been obtained via exercising the Unix \texttt{find} utility in a \texttt{TeXLive\ 2022} installation (possibly only partial). To test a font the package provides \texttt{\lgrmathgreektable} and \texttt{\lgrmathgreektableextra} which are documented in the next section.

```bash
in directory /usr/local/texlive/2022/texmf-dist/tex/latex we execute
find . -name 'LGR*fd'
and then rearrange somewhat the output to put it in alphabetical order,
and gain some space horizontally so as to obtain a two-column display
Naturally in many instances the various -TLF, -OsF, and so on, refer
to options of digit characters and have no impact on the Greek letters,
nevertheless I kept all filenames, just pick one, drop LGR and .\texttt{fd} parts.
```

| ./alegreya/ | ./librefranklin/ |
| LGRAlegreya-Inf.fd | LGRLibreFranklin-Sup.fd |
| LGRAlegreya-LF.fd | LGRLibreFranklin-TLF.fd |
| LGRAlegreya-OsF.fd | ./linguisticspro/ |
| LGRAlegreya-Sup.fd | LGRLinguisticsPro-LF.fd |
| LGRAlegreya-TLF.fd | LGRLinguisticsPro-OsF.fd |
| LGRAlegreya-TosF.fd | ./nimbus15/ |
And now for more, with lowercase 'lgr' filenames: find . -name 'lgr*fd'

\begin{verbatim}
./txfonts/lgrrtxr.fd ./cm-lgc/lgrrfcm.fd
./txfonts/lgrrtxrc.fd ./cm-lgc/lgrrfct.fd
./txfonts/lgrrtxry.fd ./cm-lgc/lgrrfcs.fd
./gfsbodoni/lgrrbodoni.fd ./gfssolomos/lgrrsolomos.fd
./lxfonts/lgrrlcmatt.fd ./tempora/lgrrtempora-tlf.fd
./lxfonts/lgrrlcmss.fd ./tempora/lgrrtempora-tosf.fd
./kerkis/lgrrkfn.fd ./gfscomplutum/lgrrcomplutum.fd
./kerkis/lgrrmakfd.fd ./gfsartemisia/lgrrartemisiaeuler.fd
./kerkis/lgrrmak.fd ./gfsartemisia/lgrrartemisia.fd
./cbfonts-fd/lgrrcmro.fd ./gentium-tug/lgrrgentiumbook.fd
./cbfonts-fd/lgrrcmss.fd ./gentium-tug/lgrrgentium.fd
./cbfonts-fd/lgrrlmfd.fd ./gfsbaskerville/lgrrfsbaskerville.fd
./cbfonts-fd/lgrrlcmatt.fd ./miama/lgrrfmm.fd
./cbfonts-fd/lgrrlmtd.fd ./gfsneohellenic/lgrrneohellenic.fd
./cbfonts-fd/lgrrlmss.fd ./gfsdidot/lgrrdidot.fd
./cbfonts-fd/lgrrlmro.fd ./gfsporson/lgrrporson.fd
./cbfonts-fd/lgrrlcmss.fd ./cbfonts-fd/lgrrlcmro.fd
./cbfonts-fd/lgrrlmro.fd ./cbfonts-fd/lgrrcmss.fd
\end{verbatim}

\textbf{upshape}=(\shape) Declares the shape to be used by the \textbackslash up Greek letters and the \textbackslash lgrmathup math alphabet. Defaults to 'n' (without the quotes).

\textbf{itshape}=(\shape) Declares the shape to be used by the \textbackslash it Greek letters and the \textbackslash lgrmathit math alphabet. Defaults to 'it'.
**style**=(ISO|UP|TeX) specifies the shape style of the Greek letters.

ISO means ‘italic’ for lowercase and uppercase, UP means ‘upright’ for lowercase and uppercase, TeX means ‘italic’ for lowercase and ‘upright’ for uppercase. The lowercase forms iso, up and tex are also accepted (or any mixed case).

One can also use French or french as an alias to UP or up.

This option will override any **greek** or **Greek** option. The package defaults to style=TeX.

What ‘upright’ and ‘italic’ mean is configured by the upshape and itshape respective settings.

**greek**=(up|it|...) Says whether Greek letters will be ‘upright’ or ‘italic’ i.e. whether they obey the upshape or itshape setting, i.e. whether \alpha et al. are \texttt{\let} to \texttt{\alphaurm} (et al.) or to \texttt{\alphaitm} (et al.).

So greek=it is like style=ISO, and greek=up is like style=French.

Other shape values, such as ‘n’ and ‘sl’ or even ‘sc’, are accepted. For more details, see the explanations for Greek. For example greek=n is like style=UP.

This option is ignored if style is used (order does not matter).

**Greek**=(up|it|...) Says whether uppercase Greek letters (and only them) will be ‘upright’ or ‘italic’ i.e. whether they use upshape or itshape, i.e. whether \texttt{\Alpha} et al. are \texttt{\let} to \texttt{\Alphaurm} (et al.) or to \texttt{\Alphaitm} (et al.).

So to obtain lowercase to be ‘upright’ and uppercase to be ‘italic’, use greek=up and then **Greek**=it (**Greek** must appear after **greek** else it will be shadowed by it).

This option, like the **greek** option, is ignored if the **style** option is used.

Other shape values, such as ‘n’ and ‘sl’, are accepted. They will then override the upshape setting for it to match it. For example **Greek**=sc will force upshape to be sc, because the assumed style is the TeX one of italic lowercase and upright uppercase, so setting the shape of uppercase must update the upshape value.

**series**=(series) This tells which series to use. The default is the value of \texttt{\seriesdefault} at the time of loading the package. There is no interface to configure distinct series for the ‘upright’ and ‘italic’ shapes.

**boldseries**=(series) This tells which series to use in bold math. Default is \texttt{\bfdefault} at the time of loading the package. There is no interface to configure distinct series for the ‘upright’ and ‘italic’ shapes.

**alphabets** Says whether to define \texttt{\lgrmathup} and \texttt{\lgrmathit}.
3 Commands of the \lgrmath package

Here are the commands defined by the package:

\lgrmathsetup{⟨key=value,...⟩} The only allowed keys are style, greek and Greek. And for the latter two only the values up or it should be used (or values matching the upshape or itshape settings), as it is only possible after package loading time to toggle between ‘upright’ and ‘italic’ depending on whether the letter is uppercase or lowercase, but one can not switch to an altogether different shape as this would require re-declaring the symbol fonts.

If the style key is used, then greek/Greek are ignored. However, one can always naturally reuse later \lgrmathsetup using only the greek and/or Greek keys.

\lgrmathup This is a math alphabet. It is defined only if the package received the alphabets option.

\lgrmathit This is a math alphabet. It is defined only if the package received the alphabets option.

\lgrmathgreektable{⟨family⟩}{⟨series⟩}{⟨shape⟩} Produces a tabular display of the Greek letters available with this font. Here is for example using

\lgrmathgreektable{Alegreya-TLF}{regular}{n}

<table>
<thead>
<tr>
<th>\Alpha</th>
<th>\Nu</th>
<th>\alpha</th>
<th>\nu</th>
<th>\upsilon</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>N</td>
<td>a</td>
<td>n</td>
<td>\upsilon</td>
</tr>
</tbody>
</table>

\lgrmathgreektableextra{⟨family⟩}{⟨series⟩}{⟨shape⟩} Produces a tabular with eight additional glyphs. Here is an example, using

\lgrmathgreektableextra{LibertinusSans-TLF}{m}{n}

<table>
<thead>
<tr>
<th>varsigma</th>
<th>\varsigma</th>
<th>\varSigma</th>
<th>\varsigma</th>
</tr>
</thead>
<tbody>
<tr>
<td>\varsigma</td>
<td>\varsigma</td>
<td>\varSigma</td>
<td>\varsigma</td>
</tr>
<tr>
<td>\varsigma</td>
<td>\varsigma</td>
<td>\varSigma</td>
<td>\varsigma</td>
</tr>
</tbody>
</table>

We used regular for the ⟨series⟩ mandatory argument after seeing Font Info messages in the .log file about the m series not being available and being substituted for by regular, so we used regular to avoid those messages.
Beware that if we had forgotten the –TLF suffix, the font would have been substituted in favour of fall-back \texttt{lmr} by \LaTeX. Always check log for font substitutions messages...

And see also the last remark below.

Miscellaneous remarks:

1. Even if not receiving the option \texttt{alphabets}, the package will declare all Greek letters to be of type \texttt{\mathalpha}.

2. The \texttt{lgrmath} package ignores global class options. It handles only options originating from the \texttt{\usepackage} preamble declaration (or some options handed over via \texttt{\PassOptionsToPackage} or options passed to \texttt{lgrmathsetup} in the preamble or body).

3. The \texttt{libgreek} package defines \texttt{\mathchar}’s mapping to lowercase Greek letters with diacritics, but for time being it has been decided that \texttt{lgrmath} would restrict its definitions to the 24+24 base glyphs and the 8 “extra” ones for which there are slots in the LGR encoding table.

4. These 8 “extra glyphs” will not always be available, depending on the font. Here is for example with \texttt{Alegreya-TLF}:
   \begin{verbatim}
   \varsigma \varsigma \varsigma
   \digamma \digamma \digamma
   \koppa \koppa \koppa
   \sampi \sampi \sampi
   \end{verbatim}

   Adding \texttt{\tracinglostchars=3} will cause \TeX{} to raise an error in case such missing characters are encountered.

This is the end of the user documentation. The next section is a code listing with some comments for the advanced users.
4 Implementation of the \texttt{lgrmath} package

\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{lgrmath}
[2022/11/16 1.0 Greek in math mode via LGR font of one's choice (JFB)]

We will use \texttt{kvoptions} to handle options with key=value syntax.

\RequirePackage{kvoptions}

To minimize the author's task, we keep close to \texttt{libgreek.sty} code with minimal adaptations. In particular I decided to keep the fact that \texttt{style} option makes the \texttt{Greek} and \texttt{greek} options ignored. But there are some complications originating in the addition of the \texttt{lgrmathsetup}, which requires to keep a trace of various things, for example if \texttt{style} option is used at package level and then later on using \texttt{lgrmathsetup} the user employs the \texttt{Greek/greek} options.

This package assigns two symbol fonts, one for upright, the other one for italic-like.

The \texttt{upshape} and \texttt{itshape} keys allow to configure what the \texttt{\ldots up} and \texttt{\ldots it} macros will actually use as shapes.

\begin{verbatim}
5 \def\lgrmath@fontfamily{lmr}
6 \def\lgrmath@scale{1}
7 \def\lgrmath@upshape{n}
8 \def\lgrmath@itshape{it}
9 \newif\iflgrmath@upper@up\lgrmath@upper@uptrue
10 \newif\iflgrmath@lower@up
11 \edef\lgrmath@series{\seriesdefault}
12 \edef\lgrmath@boldseries{\bfdefault}
13 \def\lgrmath@upper@shape{\lgrmath@upshape}
14 \def\lgrmath@lower@shape{\lgrmath@itshape}
15 \def\lgrmath@style{TeX}
16 \newif\iflgrmath@sty
\end{verbatim}

We use the \texttt{keyval} interface mostly to not have to rework everything, if at all possible, into the \texttt{kvoptions} declarative interface. It is a very good thing that the latter package can be used without forcing on the user its own declarative interface...

\begin{verbatim}
17 \define@key{lgrmath}{font}[lmr]{\def\lgrmath@fontfamily{#1}}
18 \define@key{lgrmath}{upshape}{\edef\lgrmath@upshape{#1}}
19 \define@key{lgrmath}{itshape}{\edef\lgrmath@itshape{#1}}
20 \define@key{lgrmath}{style}{% \edef\lgrmath@style{#1} % % \expandafter{\expandafter{\lgrmath@style}} % \lgrmath@stytrue
21 \define@key{lgrmath}{Greek}{\edef\lgrmath@upper@shape{#1}}
22 \define@key{lgrmath}{greek}{\edef\lgrmath@lower@shape{#1} % % \edef\lgrmath@upper@shape{#1}}
23 \define@key{lgrmath}{series}{\edef\lgrmath@series{#1}}
24 \define@key{lgrmath}{boldseries}{\edef\lgrmath@boldseries{#1}}
25
26 \define@key{lgrmath}{style}{% \edef\lgrmath@style{#1} % % \expandafter{\expandafter{\lgrmath@style}} % \lgrmath@stytrue
27 \define@key{lgrmath}{Greek}{\edef\lgrmath@upper@shape{#1}}
28 \define@key{lgrmath}{greek}{\edef\lgrmath@lower@shape{#1} % % \edef\lgrmath@upper@shape{#1}}
29 \define@key{lgrmath}{series}{\edef\lgrmath@series{#1}}
30 \define@key{lgrmath}{boldseries}{\edef\lgrmath@boldseries{#1}}
\end{verbatim}

Compared to \texttt{libgreek 1.1} I decide to use \texttt{\lowercase} and allow \texttt{UP} as alias of French.

Attention to not introduce a space token, as this may be used via \texttt{lgrmathsetup} in document body.

\begin{verbatim}
31 \define@key{lgrmath}{Greek}{\edef\lgrmath@upper@shape{#1}}
32 \define@key{lgrmath}{greek}{\edef\lgrmath@lower@shape{#1} % % \edef\lgrmath@upper@shape{#1}}
33 \define@key{lgrmath}{series}{\edef\lgrmath@series{#1}}
34 \define@key{lgrmath}{boldseries}{\edef\lgrmath@boldseries{#1}}
\end{verbatim}
The single Boolean option, a true one as it uses `kvoptions` interface.

31 \DeclareBoolOption[false]{alphabets}

We need some auxiliaries to handle the `style` values. As mentioned already, some extra stuff is executed for reasons of various scenarios with `\lgrmathsetup`.

32 \def\lgrmath@style@iso{%
33 \lgrmath@upper@upfalse
34 \lgrmath@lower@upfalse
35 \let\lgrmath@upper@shape\lgrmath@itshape
36 \let\lgrmath@lower@shape\lgrmath@itshape
37 }

38 \def\lgrmath@style@french{%
39 \lgrmath@upper@uptrue
40 \lgrmath@lower@uptrue
41 \let\lgrmath@upper@shape\lgrmath@upshape
42 \let\lgrmath@lower@shape\lgrmath@upshape
43 }

44 \let\lgrmath@style@up\lgrmath@style@french
45 \def\lgrmath@k@style@tex{%
46 \lgrmath@upper@uptrue
47 \lgrmath@lower@upfalse
48 \let\lgrmath@upper@shape\lgrmath@upshape
49 \let\lgrmath@lower@shape\lgrmath@itshape
50 }

This always resets the `if\lgrmath@style` to false for `\lgrmathsetup` being usable with Greek and Greek keys.

51 \def\lgrmath@process@style{%
52 \lgrmath@styfalse
53 \ifcsname lgrmath@style@\lgrmath@style\endcsname
54 \csname lgrmath@style@\lgrmath@style\endcsname
55 \else
56 \PackageWarning{lgrmath}{Unknown (here, lowercased) style `\lgrmath@style'}%
57 \fi
58 }

This stuff is a bit involved.

59 \def\lgrmath@process@shapes{%
60 \edef\lgrmath@upper@shape{\lgrmath@upper@shape}%
61 \edef\lgrmath@lower@shape{\lgrmath@lower@shape}%
62 \ifx\lgrmath@upper@shape\lgrmath@upshape
63 \lgrmath@upper@uptrue
64 \else
65 \lgrmath@upper@upfalse
66 \lgrmath@upper@upitshape
67 \else
68 \expandafter\in@\expandafter{\expandafter.\lgrmath@upper@shape,}{.up,}%
69 \ifin@\lgrmath@upper@uptrue
70 \else
71 \expandafter\in@\expandafter{\expandafter.\lgrmath@upper@shape,}{.it,}%
The fact that packages may be handed global options is rather dangerous. Fortunately \texttt{kvoptions} has an interface to handle only local options.

We now do the post-processing regarding the shape configuration after option parsing. Once this is done we will reconfigure slightly \texttt{\lgrmath@process@shapes} for usability in the document preamble or body, after the symbol fonts have been declared. As is well-known the \LaTeX{} interface to math fonts is full of “only-preamble” restrictions.

\begin{verbatim}
\if\lgrmath@sty\def\lgrmath@process@style{\%
\let\lgrmath@upshape\lgrmath@upper@shape
\}
\else\def\lgrmath@process@shapes{\%
\let\lgrmath@itshape\lgrmath@lower@shape
\}
\fi
\end{verbatim}


\begin{verbatim}
\PackageWarning{lgrmath}{Too late for the shape \enquote{\lgrmath@upper@shape} originating in Greek or greek option. Ignored.\MessageBreak
Use \enquote{up} or \enquote{it}}%
\end{verbatim}

\begin{verbatim}
\PackageWarning{lgrmath}{Too late for the shape \enquote{\lgrmath@lower@shape}}
\end{verbatim}
originating in greek option. Ignored.

Use `up` or `it`% 

\def\lgrmathsetup#1{% 
\setkeys{lgrmath}{#1}%
\iflgrmath@sty\lgrmath@process@style\else\lgrmath@process@shapes\fi 
\lgrmath@setgreekcs 
%

Almost all options must be restricted to the package loading time only.
\DisableKeyvalOption{lgrmath}{font}
\DisableKeyvalOption{lgrmath}{upshape}
\DisableKeyvalOption{lgrmath}{itshape}
\DisableKeyvalOption{lgrmath}{series}
\DisableKeyvalOption{lgrmath}{boldseries}
\DisableKeyvalOption{lgrmath}{alphabets}

Declarations of the two symbol fonts, one for ‘upright’ (or whatever is configured by the upshape key), one for ‘italic’ (or whatever is configured by the itshape key). One can not specify distinct series, both ‘upright’ and ‘italic’ use the same font series. This could be added but I doubt anyone will use the package to start with...

The libgreek of 2022/11/11 extracted the ~TLF postfix from the font family name, to reinsert it here explicitly, the options serif/sans deciding whether to use LibertinusSerif-TLF or LibertinusSans-TLF for reasons now escaping me. I vaguely remember it was useful at some point during development. Ah yes, now I remember this separation was for the handling of the scale option. And we haven’t one here.

\DeclareFontEncoding{LGR}{}{}
\DeclareSymbolFont{lgrmathup}{LGR}{\lgrmath@fontfamily}{\lgrmath@series}{\lgrmath@upshape}
\SetSymbolFont{lgrmathup}{bold}{LGR}{\lgrmath@fontfamily}{\lgrmath@boldseries}{\lgrmath@upshape}
\DeclareSymbolFont{lgrmathit}{LGR}{\lgrmath@fontfamily}{\lgrmath@series}{\lgrmath@itshape}
\SetSymbolFont{lgrmathit}{bold}{LGR}{\lgrmath@fontfamily}{\lgrmath@boldseries}{\lgrmath@itshape}

As all Greek letters are already available in \...up and \...it variants, it is indeed not immediately pressing to have math alphabets, so let’s not do it by default.
\iflgrmath@alphabets 
\DeclareSymbolFontAlphabet{\lgrmathup}{lgrmathup}
\DeclareSymbolFontAlphabet{\lgrmathit}{lgrmathit}
\fi

Definition of the ‘up’ \mathchar’s. There are 48 ‘standard’ ones plus 8 extras.

Hesitation whether I should declare with \mathalpha only if alphabets is passed to the package.
\DeclareMathSymbol{\Alphaup}{\mathalpha}{\lgrmathup}{65}
Definition of the $'it'$ mathchar's.
\DeclareMathSymbol{\Betait}{\mathalpha}{lgrmathit}{66}
\DeclareMathSymbol{\Gammait}{\mathalpha}{lgrmathit}{71}
\DeclareMathSymbol{\Deltait}{\mathalpha}{lgrmathit}{68}
\DeclareMathSymbol{\Epsilonit}{\mathalpha}{lgrmathit}{69}
\DeclareMathSymbol{\Zetait}{\mathalpha}{lgrmathit}{90}
\DeclareMathSymbol{\Etait}{\mathalpha}{lgrmathit}{72}
\DeclareMathSymbol{\Thetait}{\mathalpha}{lgrmathit}{74}
\DeclareMathSymbol{\Iotait}{\mathalpha}{lgrmathit}{73}
\DeclareMathSymbol{\Kappait}{\mathalpha}{lgrmathit}{75}
\DeclareMathSymbol{\Lambdait}{\mathalpha}{lgrmathit}{76}
\DeclareMathSymbol{\Muit}{\mathalpha}{lgrmathit}{77}
\DeclareMathSymbol{\Nuit}{\mathalpha}{lgrmathit}{78}
\DeclareMathSymbol{\Xiit}{\mathalpha}{lgrmathit}{88}
\DeclareMathSymbol{\Omicronit}{\mathalpha}{lgrmathit}{79}
\DeclareMathSymbol{\Piit}{\mathalpha}{lgrmathit}{80}
\DeclareMathSymbol{\Rhoit}{\mathalpha}{lgrmathit}{82}
\DeclareMathSymbol{\Sigmait}{\mathalpha}{lgrmathit}{83}
\DeclareMathSymbol{\Tauit}{\mathalpha}{lgrmathit}{84}
\DeclareMathSymbol{\Upsilonit}{\mathalpha}{lgrmathit}{85}
\DeclareMathSymbol{\Phiit}{\mathalpha}{lgrmathit}{86}
\DeclareMathSymbol{\Chiit}{\mathalpha}{lgrmathit}{87}
\DeclareMathSymbol{\Psiit}{\mathalpha}{lgrmathit}{89}
\DeclareMathSymbol{\Omegait}{\mathalpha}{lgrmathit}{90}
\DeclareMathSymbol{\alphait}{\mathalpha}{lgrmathit}{97}
\DeclareMathSymbol{\betait}{\mathalpha}{lgrmathit}{98}
\DeclareMathSymbol{\gammait}{\mathalpha}{lgrmathit}{103}
\DeclareMathSymbol{\deltait}{\mathalpha}{lgrmathit}{104}
\DeclareMathSymbol{\epsilonit}{\mathalpha}{lgrmathit}{105}
\DeclareMathSymbol{\zetait}{\mathalpha}{lgrmathit}{106}
\DeclareMathSymbol{\etait}{\mathalpha}{lgrmathit}{107}
\DeclareMathSymbol{\thetait}{\mathalpha}{lgrmathit}{108}
\DeclareMathSymbol{\iotait}{\mathalpha}{lgrmathit}{109}
\DeclareMathSymbol{\kappait}{\mathalpha}{lgrmathit}{110}
\DeclareMathSymbol{\lambdait}{\mathalpha}{lgrmathit}{111}
\DeclareMathSymbol{\muit}{\mathalpha}{lgrmathit}{112}
\DeclareMathSymbol{\nuit}{\mathalpha}{lgrmathit}{113}
\DeclareMathSymbol{\xiit}{\mathalpha}{lgrmathit}{114}
\DeclareMathSymbol{\omicronit}{\mathalpha}{lgrmathit}{115}
\DeclareMathSymbol{\piit}{\mathalpha}{lgrmathit}{116}
\DeclareMathSymbol{\rhoit}{\mathalpha}{lgrmathit}{117}
\DeclareMathSymbol{\sigmait}{\mathalpha}{lgrmathit}{118}
\DeclareMathSymbol{\tauit}{\mathalpha}{lgrmathit}{119}
\DeclareMathSymbol{\upsilonit}{\mathalpha}{lgrmathit}{120}
\DeclareMathSymbol{\phiit}{\mathalpha}{lgrmathit}{121}
\DeclareMathSymbol{\chiit}{\mathalpha}{lgrmathit}{122}
\DeclareMathSymbol{\psiit}{\mathalpha}{lgrmathit}{123}
\DeclareMathSymbol{\omegait}{\mathalpha}{lgrmathit}{124}

Extras: alternate shapes and other glyphs, ‘upright’.

\DeclareMathSymbol{\varsigmaup}{\mathalpha}{lgrmathup}{99}
Some glyphs with diacritics. I decided not to keep this in \textit{lgrmath}. Let’s wait for extremely improbable feature request, as I won’t do the feature request and will probably remain the sole user. Actually I don’t think I will ever use this package as contexts where it could be useful are those where I would use \textit{mathastext} and its \textit{LGRgreek} option and \textit{\MTgreekfont} command...

Definition of the \textit{\mathchar}’s without ‘up/it’ postfix. There are 27=24+3 uppercase and 29=24+5 lowercase letters, for a total of 56=48+8 glyphs. Actually, I had done some work with LGR in September 2011. I kept the file around. But at no point did I go back to check if I had done exhaustive work in 2011 and whether some other glyphs could be accounted for by LGR (not using ligatures) (I did re-check an old file about the LGR encoding I had from that 2011 work, but did not try to check for updates). Anyway, it is very doubtful whether it made...
any sense for \texttt{lgrmath} to define control sequences for Greek letters with diacritics...

\begin{verbatim}
\def\lgrmath@setgreekcs{%
  \iflgrmath@upper@up
    \let\Alpha\Alphaup
    \let\Beta\Betaup
    \let\Gamma\Gammaup
    \let\Delta\Deltaup
    \let\Epsilon\Epsilonup
    \let\Zeta\Zetaup
    \let\Theta\Thetaup
    \let\Iota\Iotaup
    \let\Kappa\Kappaup
    \let\Lambda\Lambdaup
    \let\Mu\Muup
    \let\Nu\Nuup
    \let\Xi\Xiup
    \let\Omicron\Omicronup
    \let\Pi\Piup
    \let\Rho\Rhoup
    \let\Sigma\Sigmaup
    \let\Tau\Taul
    \let\Upsilon\Upsilonup
    \let\Phi\Phiup
    \let\Chi\Chiu
    \let\Psi\Psip
    \let\Omega\Omegaup
    \let\Sampi\Sampiup
    \let\Digamma\Digammaup
    \let\varSigma\varSigmaup
  \else
    \let\Alpha\Alphait
    \let\Beta\Betait
    \let\Gamma\Gammait
    \let\Delta\Deltait
    \let\Epsilon\Epsilonit
    \let\Zeta\Zetait
    \let\Eta\Etait
    \let\Theta\Thetait
    \let\Iota\Iotait
    \let\Kappa\Kappait
    \let\Lambda\Lambdait
    \let\Mu\Muit
    \let\Nu\Nuit
    \let\Xi\Xiit
    \let\Omicron\Omicronit
    \let\Pi\Piit
    \let\Rho\Rhoit
    \let\Sigma\Sigmait
  \end{verbatim}
The doc macrocode makes no provision for being interrupted invisibly, it is very complicated (but possible) to do this (see https://github.com/latex3/latex2e/issues/847), but simplest is to babble something here like this paragraph.
% \let\upsilontonos\upsilontonosup
% \let\omegatonos\omegatonosup
% \let\upsilondieresistonos\upsilondieresistonosup
% \let\iotadieresis\iotadieresisup
% \let\iotadieresistonos\iotadieresistonosup
% \let\upsilondieresisisup

babble
345 \else
346 \let\alpha\alphait
347 \let\beta\betait
348 \let\gamma\gammait
349 \let\delta\deltait
350 \let\epsilon\epsilonit
351 \let\zeta\zetait
352 \let\eta\etait
353 \let\theta\thetait
354 \let\iota\iotait
355 \let\kappa\kappait
356 \let\lambda\lambdait
357 \let\mu\muit
358 \let\nu\nuit
359 \let\xi\xiit
360 \let\omicron\omicronit
361 \let\pi\piit
362 \let\rho\rhoit
363 \let\sigma\sigmait
364 \let\tau\tauit
365 \let\upsilon\upsilonit
366 \let\phi\phiit
367 \let\chi\chiit
368 \let\psi\psiit
369 \let\omega\omegait
370 \let\varsigma\varsigmait
371 \let\varvarsigma\varvarsigmait
372 \let\sampi\sampiit
373 \let\digamma\digammait
374 \let\koppa\koppait

babble
% \let\alphatonos\alphatonosit
% \let\epsilontonos\epsilontonosit
% \let\etatonos\etatonosit
% \let\iotatonos\iotatonosit
% \let\omicrontonos\omicrontonosit
% \let\upsilontonos\upsilontonosit
% \let\omegatonos\omegatonosit
% \let\upsilondieresistonos\upsilondieresistonosit
% \let\iotadieresisisit
% \let\iotadieresistonos\iotadieresistonosit
Finally we define \lgrmathgreektable and \lgrmathgreektableextra.

\def\lgrmathgreektable#1#2#3{\begingroup
  \def\s##1{{\usefont{T1}{mlmtt}{m}{n}\string##1}}\usefont{LGR}{#1}{#2}{#3}\
  \begin{tabular}{|lc|lc|lc|lc|}
    \hline
    \s\Alpha & A & \s\Nu & N & \s\alpha & a & \s\nu & n \\
    \s\Beta & B & \s\Xi & X & \s\beta & b & \s\xi & x \\
    \s\Gamma & G & \s\Omicron & O & \s\gamma & g & \s\omicron & o \\
    \s\Delta & D & \s\Pi & P & \s\delta & d & \s\pi & p \\
    \s\Epsilon & E & \s\Rho & R & \s\epsilon & e & \s\rho & r \\
    \s\Zeta & Z & \s\Sigma & S & \s\zeta & z & \s\sigma & s \\
    \s\Eta & H & \s\Tau & T & \s\eta & h & \s\tau & t \\
    \s\Theta & J & \s\Upsilon & U & \s\theta & j & \s\upsilon & u \\
    \s\Iota & I & \s\Phi & F & \s\iota & i & \s\phi & f \\
    \s\Kappa & K & \s\Chi & Q & \s\kappa & k & \s\chi & q \\
    \s\Lambda & L & \s\Psi & Y & \s\lambda & l & \s\psi & y \\
    \s\Mu & M & \s\Omega & W & \s\mu & m & \s\omega & w \\
    \hline
  \end{tabular}\
\endgroup}

\def\lgrmathgreektableextra#1#2#3{\begingroup
  \def\s##1{{\usefont{T1}{mlmtt}{m}{n}\string##1}}\usefont{LGR}{#1}{#2}{#3}\
  \begin{tabular}{lclclc}
    \s\varsigma & \char99 & \s\digamma & \char147 & \s\varSigma & \char22 \\
    \s\varvarsigma & \char6 & \s\koppa & \char18 & \s\Sampi & \char23 \\
    \s\sampi & \char27 & \ & \ & \s\Digamma & \char195elax
  \end{tabular}\
\endgroup}

And we have now reached the end of the lgrmath package code. The actual .sty file will contain an \endinput added by the DocStrip extraction.