

The lua-unicode-math package*

Marcel Krüger

tex@2krueger.de

<https://github.com/zauguin/lua-unicode-math>

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Modern fonts are usually provided in OpenType format and are designed for Unicode based input. For mathematical fonts this usually means the use of fonts with an OpenType MATH table: Fonts containing special metadata needed to make them usable in a mathematical context.

In Lua_{TeX} such fonts have traditionally been loaded with the `unicode-math` package. While this works, is very flexible and allows to use the same document in Xe_{TeX} and Lua_{TeX} it has performance issues and it sometimes has unexpected interactions with the use of math versions. The `lua-unicode-math` is a specific Lua_{La}TeX specific alternative which aims for higher performance and better integration with native Lua_{TeX} features.

1 Usage instructions

1.1 Font packages

For most Opentype the recommended way to load them with `lua-unicode-math` is to use a dedicated package. Currently the following packages are shipped with `lua-unicode-math`:

Font	Package
Latin Modern Math	<code>lum-lmodern</code>
New Computer Modern Math	<code>lum-newcomputermodern</code>
STIX2	<code>lum-stix2</code>
XITS	<code>lum-xits</code>
TeX Gyre Pagella Math	<code>lum-pagella</code>
TeX Gyre DejaVu Math	<code>lum-dejavu</code>
TeX Gyre Bonum Math	<code>lum-bonum</code>
TeX Gyre Schola Math	<code>lum-schola</code>
TeX Gyre Termes Math	<code>lum-termes</code>
Fira Math	<code>lum-fira</code>
GFS Neohellenic Math	<code>lum-gfsneohellenic</code>
Erewhon Math	<code>lum-erewhon</code>
XCharter Math	<code>lum-xcharter</code>
Concrete Math	<code>lum-concrete</code>

*This document corresponds to `lua-unicode-math` v0.4, dated 2026-01-02.

1.2 Loading fonts by name

If you want to use a custom font, you can load `fontspec` and `lua-unicode-math` using

```
\usepackage{fontspec, lua-unicode-math}
```

This will load Latin Modern Math by default. Another math font can be loaded using `\setmathfont` using the same options as `fontspec`'s `\newfontfamily`. For example, you can use to to configure the current math font using

```
\setmathfont[AutoFakeBold=1]{Latin Modern Math}
```

1.3 Writing maths

There are two ways of entering math: You can directly input Unicode math symbols or use regular L^AT_EX commands for symbols. All Unicode symbols are supported with the same commands as in `unicode-math`. For a full list see `texdoc unimath-symbols`.

2 Implementation

```
1 \ProvidesExplPackage
2   {lua-unicode-math}
3   {2026-01-02}
4   {0.4}
5   {Opentype Math support for LuaLaTeX}
6
7 <@@=l_uni_math>
8 \int_new:N \g__l_uni_math_font_count_int
9 \tl_new:N \l__l_uni_math_main_family_tl
10 \tl_new:N \l__l_uni_math_script_family_tl
11 \tl_new:N \l__l_uni_math_scriptscript_family_tl
12
13 \cs_generate_variant:Nn \tl_if_eq:nnT {o}
14
15 \msg_new:nnn { l_uni_math } { engine-unsupported } {
16   lua-unicode-math~can~only~be~used~with~LuaTeX.
17 }
18
19 \sys_if_engine luatex:F {
20   \msg_critical:nn { l_uni_math } { engine-unsupported }
21 }
22
23 \msg_new:nnn { l_uni_math } { unicode-math-suppressed } {
24   You~tried~to~load~both~lua-unicode-math~and~unicode-math~
25   in~the~same~document.~This~is~not~supported,~unicode-math~
26   will~be~suppressed.~There~is~a~good~chance~that~this~will~
27   break~your~document.~Change~your~document~to~only~use~lua-unicode-math~
28   so~solve~this.
29 }
30 \msg_new:nnn { l_uni_math } { unicode-math-loaded } {
31   You~tried~to~load~lua-unicode-math~while~unicode-math~
32   was~already~loaded.~This~does~not~work.~Please~avoid~loading~
33   unicode-math.~If~that~is~not~possible~and~you~are~feeling~adventurous~
34   you~can~try~loading~the~lua-unicode-math~package~at~the~beginning~
```

```

35   of~your~document~instead~to~suppress~unicode-math.
36 }
37 \disable@package@load{unicode-math} {
38   \msg_warning:nn { l_uni_math } {unicode-math-incompatible }
39 }
40 \IfPackageLoadedTF {unicode-math} {
41   \msg_critical:nn { l_uni_math } {unicode-math-loaded }
42 } {}
43
44
45 \IfFormatAtLeastTF{2026/01/01}{}{
46   \cs_set:Npn \DeclareMathScriptfontMapping #1 #2 #3 #4 #5 #6 {
47     \cs_gset:cpn { __nfss_mapped_scriptfont_family_sf_ #1 / #2 } { #3 / #4 }
48     \cs_gset:cpn { __nfss_mapped_scriptfont_family_ssf_ #1 / #2 } { #5 / #6 }
49   }
50 }
51
52 \hook_gput_code:nnn { package/fontspect/after } {.} {
53   \bool_gset_false:N \g__fontspec_math_bool
54
55   \NewDocumentCommand \setmathfont { O{} m O{} } {
56     \int_incr:N \g__l_uni_math_font_count_int
57     \exp_args:Nc \newfontfamily
58       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _text_font }
59       { #2 }
60     [ #1, #3, Script = Math, Renderer = Base ]
61     \tl_set_eq:NN \l__l_uni_math_main_family_tl \l_fontspec_family_tl
62
63     \exp_args:Nc \newfontfamily
64       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _script_font }
65       { #2 }
66     [ #1, #3, Script = Math, Renderer = Base, Style = MathScript ]
67     \tl_set_eq:NN \l__l_uni_math_script_family_tl \l_fontspec_family_tl
68
69     \exp_args:Nc \newfontfamily
70       { g__l_uni_math_font_ \int_use:N \g__l_uni_math_font_count_int _scriptscript_font }
71       { #2 }
72     [ #1, #3, Script = Math, Renderer = Base, Style = MathScriptScript ]
73     \tl_set_eq:NN \l__l_uni_math_scriptscript_family_tl \l_fontspec_family_tl
74
75     \DeclareMathScriptfontMapping {TU} {\l__l_uni_math_main_family_tl} {TU} {\l__l_uni_math_s
76
77     \exp_args:NnnV \DeclareSymbolFont {lummain} {TU} \l__l_uni_math_main_family_tl {m} {n}
78     \exp_args:NnnV \SetSymbolFont {lummain} {bold} {TU} \l__l_uni_math_main_family_tl {b} {n
79   }
80
81   \cs_set:Nn \__fontspec_setmainfont_hook:nn
82     {
83       \tl_if_eq:onT {\g__fontspec_mathrm_tl} {\rmdefault}
84       {
85         \fontspec_gset_family:Nnn \g__fontspec_mathrm_tl {Renderer=Basic,#1} {#2}
86         \__fontspec_setmathrm_hook:nn {#1} {#2}
87       }
88     }

```

```

89 \cs_set:Nn \__fontspec_setsansfont_hook:nn
90 {
91     \tl_if_eq:onT {\g__fontspec_mathsf_tl} {\sfdefault}
92     {
93         \fontspec_gset_family:Nnn \g__fontspec_mathsf_tl {Renderer=Basic,#1} {#2}
94         \__fontspec_setmathsf_hook:nn {#1} {#2}
95     }
96 }
97 \cs_set:Nn \__fontspec_setmonofont_hook:nn
98 {
99     \tl_if_eq:onT {\g__fontspec_mathtt_tl} {\ttdefault}
100     {
101         \fontspec_gset_family:Nnn \g__fontspec_mathtt_tl {Renderer=Basic,#1} {#2}
102         \__fontspec_setmathtt_hook:nn {#1} {#2}
103     }
104 }
105 \cs_set:Nn \__fontspec_setmathrm_hook:nn
106 {
107     \SetMathAlphabet \mathrm { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
108     \SetMathAlphabet \mathit { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \m
109     \SetMathAlphabet \mathbf { normal } \g_fontspec_encoding_tl \g__fontspec_mathrm_tl { \b
110 }
111 \cs_set:Nn \__fontspec_setboldmathrm_hook:nn
112 {
113     \SetMathAlphabet \mathrm { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
114     \SetMathAlphabet \mathit { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \m
115     \SetMathAlphabet \mathbf { bold } \g_fontspec_encoding_tl \g__fontspec_bfmathrm_tl { \b
116 }
117 \cs_set:Nn \__fontspec_setmathsf_hook:nn
118 {
119     \SetMathAlphabet \mathsf { normal } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \m
120     \SetMathAlphabet \mathsf { bold } \g_fontspec_encoding_tl \g__fontspec_mathsf_tl { \bfs
121 }
122 \cs_set:Nn \__fontspec_setmathtt_hook:nn
123 {
124     \SetMathAlphabet \mathtt { normal } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \m
125     \SetMathAlphabet \mathtt { bold } \g_fontspec_encoding_tl \g__fontspec_mathtt_tl { \bfs
126 }
127 %
128 \__fontspec_setmathrm_hook:nn {} {}
129 \__fontspec_setmathsf_hook:nn {} {}
130 \__fontspec_setmathtt_hook:nn {} {}
131 }
132
133 \cs_set_protected:Npn \operator@font {
134     \@fontswitch { \font@warning{Math-mode-required-for-\string\operator@font.} } { \mathtextrm
135 }
136
137 \DeclareSymbolFont {lummy} {TU} {lmm} {m} {n}
138 \SetSymbolFont {lummy} {bold} {TU} {lmm} {b} {n}
139
140 \newattribute \mathfamattr
141
142 \lua_load_module:n { lua-unicode-math }

```

```

143
144 \prop_set_from_keyval:Nn \l_tmpa_prop {
145   up = 0, bfup = 1, it = 2, bfit = 3,
146   sfup = 4, bfsfup = 5, sfit = 6, bfsfit = 7,
147   cal = 8, bfcalf = 9,
148   frak = 12, bffrak = 13,
149   tt = 16,
150   bb = 20,
151   bf = 1024,
152   normal = -"7FFFFFFF,
153   literal = -1,
154 }
155 \cs_set_eq:NN \mathup \mathrm
156 \prop_map_inline:Nn \l_tmpa_prop {
157   \cs_new_protected:cpn { sym #1 } ##1 {
158     {
159       \mathfamattr = #2 \scan_stop:
160       ##1
161     }
162   }
163   \cs_if_exist:cTF { math #1 } {
164     \cs_set_eq:cc { mathtext #1 } { math #1 }
165   } {
166     \cs_set_eq:cc { math #1 } { sym #1 }
167   }
168 }
169 \cs_set_eq:NN \mathtextrm \mathrm
170 \cs_set_eq:NN \symrm \symup

```

In unicode-math there is a package option to use italic or upright letters for `\symsf` and `\sybfsf`. Depending on the setting these become aliases for `\symsfup` and `\sybfsfup` or `\symsffit` and `\sybfsffit`. Since we do not want package option, we always use upright letters and you can redefine `\symsf` and `\sybfsf` if you want to change it.

```

171 \cs_set_eq:NN \mathtextsf \mathsf
172 \cs_set_eq:NN \symsf \symsfup
173 \cs_set_eq:NN \sybfsf \sybfsfup
174
175 \clist_map_inline:nn { cal, calbf, frak, frakbf, bb } {
176   \cs_set_eq:cc { math #1 } { sym #1 }
177 }
178
179 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn } #1 #2 {
180   \cs_set:Npx #1 {
181     \char_generate:nn {#2} {12}
182   }
183 }
184 \tl_map_inline:nn {\mathbin \mathclose \mathpunct \mathrel} {
185   \cs_new_eq:cc
186     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #1 :nn }
187     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn }
188 }
189
190 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathop :nn } #1 #2 {
191   \exp_args:Nc \Umathchardef { \cs_to_str:N #1 op } 1~\symlummain #2~

```

```

192 \cs_set_eq:cn { \cs_to_str:N #1 oplimits } \scan_stop:
193 \cs_set:Npx #1 {
194   \char_generate:nn {#2} {12}
195 }
196 \mathcode #2 = "8000~
197 \cs_set:cpx { \char_generate:nn {"FFFF} {12} \char_generate:nn {#2} {12} } {
198   \use:c { \cs_to_str:N #1 op }
199   \use:c { \cs_to_str:N #1 oplimits }
200 }
201 }
202
203 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathopen :nn } #1 #2 {
204   \token_if_eq_meaning:NNTF #1 \sqrt {
205     \cs_set:Npx \sqrtsign {
206       \Uradical \symlummain #2~
207     }
208     \cs_set:Npx \root ##1 \of {
209       \Uroot \symlummain #2~ { ##1 }
210     }
211   }{
212     \cs_set:Npx #1 {
213       \char_generate:nn {#2} {12}
214     }
215   }
216 }
217
218 \group_begin:
219 \cs_set:Npn \l_tmp_cs:n #1 {
220   \group_end:
221
222   \cs_new_protected:Npn \__l_uni_math__check_mup_helper:w ##1 #1 ##2 \q_mark ##3 ##4 \q_stop
223     ##3 {##2}
224 }
225
226 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathalpha :nn } ##1 ##2 {
227   \cs_set:Npx ##1 {
228     \char_generate:nn {##2} {12}
229   }
230   \exp_after:wN \__l_uni_math__check_mup_helper:w \token_to_str:N ##1 \q_mark \cs_set_eq:cn
231 }
232 }
233
234 \exp_args:No \l_tmp_cs:n {
235   \token_to_str:N \mup
236 }
237
238 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathfence :nn } #1 #2 {
239   \cs_set:Npx #1 {
240     \char_generate:nn {#2} {12}
241   }
242   \cs_set:cpx {l \cs_to_str:N #1} {
243     \Udelimiter 4 ~ \symlummain #2 ~
244   }
245   \cs_set:cpx {r \cs_to_str:N #1} {

```

```

246     \Udelimiter 5 ~ \symlummain #2 ~
247   }
248 }
249
250 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccent :nn } #1 #2 {
251   \cs_set:Npx #1 {
252     \Umathaccent fixed 0 ~ \symlummain #2 ~
253   }
254 }
255
256 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccent :nn } #1 #2 {
257   \cs_set:Npx #1 {
258     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type~\token_to_str:N \mathbotaccent}{}
259   }
260 }
261
262 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentwide :nn } #1 #2 {
263   \cs_set:Npx #1 {
264     \Umathaccent 0 ~ \symlummain #2 ~
265   }
266 }
267
268 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccentwide :nn } #1 #2 {
269   \cs_set:Npx #1 {
270     \Umathaccent bottom 0 ~ \symlummain #2 ~
271   }
272 }
273
274 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentoverlay :nn } #1 #2 {
275   \cs_set:Npx #1 {
276     \Umathaccent overlay 0 ~ \symlummain #2 ~
277   }
278   % \cs_set:Npx #1 {
279   %   \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type~\token_to_str:N \mathaccent}{}
280   % }
281 }
282
283 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathover :nn } #1 #2 {
284   \cs_set:Npx #1 {
285     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type~\token_to_str:N \mathover}{}
286   }
287 }
288
289 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathunder :nn } #1 #2 {
290   \cs_set:Npx #1 {
291     \exp_not:N \PackageError{lua-unicode-math}{Unsupported-type~\token_to_str:N \mathunder}{}
292   }
293 }
294
295 \cs_generate_variant:Nn \exp_args:Ne {c}
296 \cs_new:Npn \UnicodeMathSymbol #1 #2 #3 #4 {
297   \use:c { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #3 :nn }
298   {#2} {#1}
299 }

```

```

300 \input {unicode-math-table}
301 \cs_undefine:N \UnicodeMathSymbol
302
303 \cs_set_protected:Npn \triangle { \mathord { \bigtriangleup } }
304 \cs_set_protected:Npn \mathellipsis { \mathinner { \unicodeellipsis } }
305 \cs_set_protected:Npn \cdots { \mathinner { \unicodcdots } }
306
307 \clist_map_inline:nn {
308   \to \rightarrow,
309   \le \leq,
310   \ge \geq,
311   \neq \neq,
312   \bigcirc \mdlgwhtcircle,
313   \circ \vysmwhtcircle,
314   \bullet \smbkcircle,
315   \mathyen \yen,
316   \mathsterling \sterling,
317   \diamond \smwhtdiamond,
318   \emptyset \varnothing,
319   \hbar \hslash,
320   \land \wedge,
321   \lor \vee,
322   \owns \ni,
323   \gets \leftarrow,
324   \mathring \ocirc,
325   \lnot \neg,
326   \longdivision \longdivisionsign,
327   \backepsilon \upbackepsilon,
328   \eth \matheth,
329   \dotsb \cdots,
330   \@cdots \cdots,
331 } {
332   \cs_set_eq:NN #1
333 }
334
335 \cs_set_eq:NN \intoplimits \nolimits
336
337 \cs_set_protected:cpx { \char_generate:nn {"FFFF"} {12} ' } {
338   \prime_helper:w "2032~
339 }
340
341 \cs_set_protected:Npn \uproot #1 {
342   \__l_uni_math_uproot:w #1 \scan_stop:
343 }
344
345 \cs_set_protected:Npn \leftroot #1 {
346   \__l_uni_math_leftroot:w #1 \scan_stop:
347 }

```

Some fixes for amsmath: Since amsmath is defining `\leftroot`, `\uproot` and `\root` with non Unicode definitions, we need to hide our definitions and restore them afterwards. We define `\varGamma` to stop amsmath from trying to define greek letter variants.

```

348 \tl_const:Nn \c__l_uni_math_amsmath_cmds_tl {
349   \uproot
350   \leftroot

```



```

351 \iint
352 \iiint
353 \iiint
354 \dddot
355 \ddddot
356 \overleftrightharpoon
357 \underrightharpoon
358 \underleftarpoon
359 \underleftrightharpoon
360 \hat
361 \check
362 \tilde
363 \acute
364 \grave
365 \dot
366 \ddot
367 \breve
368 \bar
369 \vec
370 \mathring
371 }
372 \tl_const:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
373 \root
374 \int
375 \oint
376 \overrightarrow
377 \overleftarrow
378 }
379 \hook_gput_code:nnn { package/amsmath/before } {..} {
380 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
381 \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
382 \cs_undefine:N #1
383 }
384 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
385 \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
386 }
387 \cs_set:Npn \varGamma { \temporary_definition_do_not_use }
388 }
389 \hook_gput_code:nnn { package/amsmath/after } {..} {
390 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
391 \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
392 \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
393 }
394 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
395 \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
396 \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
397 }
398 \cs_undefine:N \varGamma
399 }

```