

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 LuaTeX 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 XeTeX and LuaTeX it has performance issues and it sometimes has unexpected interactions with the use of math versions. The `lua-unicode-math` is a specific LuaLaTeX specific alternative which aims for higher performance and better integration with native LuaTeX 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>
New Computer Modern Sans Math	<code>lum-newcomputermodernsans</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` v0.6, dated 2026-01-15.

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   {2026-01-15}
4   {0.6}
5   {Opentype Math support for LuaLaTeX}
6
7 <@@=1_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 { lua-unicode-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 { lua-unicode-math } { engine-unsupported }
21 }
22
23 \msg_new:nnn { lua-unicode-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 { lua-unicode-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 { lua-unicode-math } {unicode-math-suppressed }
39 }
40 \IfPackageLoadedTF {unicode-math} {
41   \msg_critical:nn { lua-unicode-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 \cs_if_exist:NF \slimits@ {

```

```

143 \cs_set_eq:NN \slimits@ \displaylimits
144 }
145 \cs_if_exist:NF \ilimits@ {
146 \cs_set_eq:NN \ilimits@ \nolimits
147 }
148 \chardef \g_l_uni_math_dots_binary_char = `
149 \chardef \g_l_uni_math_dots_comma_char = `...
150 \chardef \g_l_uni_math_dots_int_char = `
151 \chardef \g_l_uni_math_dots_other_char = `...
152
153 \cs_set_protected:Npn \DOTSB {
154 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_binary_char
155 }
156
157 \cs_set_protected:Npn \DOTSX {
158 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_other_char
159 }
160
161 \cs_set_protected:Npn \DOTSI {
162 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_int_char
163 }
164
165 \cs_set_protected:Npn \DOTSC {
166 \__l_uni_math_set_previous_dots_type:w \g_l_uni_math_dots_comma_char
167 }
168
169 \lua_load_module:n { lua-unicode-math }
170
171 \prop_set_from_keyval:Nn \l_tmpa_prop {
172 up = 0, bfup = 1, it = 2, bfit = 3,
173 sfup = 4, bfsfup = 5, sfit = 6, bfsfit = 7,
174 cal = 8, bfcalf = 9,
175 frak = 12, bffrak = 13,
176 tt = 16,
177 bb = 20,
178 bf = 1024,
179 normal = -"7FFFFFFF,
180 }
181 \cs_set_eq:NN \mathup \mathrm
182 \cs_undefine:N \mathnormal
183 \cs_undefine:N \mathcal
184 \prop_map_inline:Nn \l_tmpa_prop {
185 \cs_new_protected:cpn { sym #1 } ##1 {
186 {
187 \mathfamattr = #2 \scan_stop:
188 ##1
189 }
190 }
191 \cs_if_exist:cTF { math #1 } {
192 \cs_set_eq:cc { mathtext #1 } { math #1 }
193 } {
194 \cs_set_eq:cc { math #1 } { sym #1 }
195 }
196 }

```

```

197 \cs_set_eq:NN \mathtextrm \mathrm
198 \cs_set_eq:NN \symrm \symup

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

199 \cs_set_eq:NN \mathtextsf \mathsf
200 \cs_set_eq:NN \symsf \symsfup
201 \cs_set_protected:Npn \mathsfup { \symsfup }
202 \cs_set_eq:NN \symbfsf \symbfsfup
203 \cs_set_protected:Npn \mathbfsf { \symbfsf }
204
205 \clist_map_inline:nn { cal, calbf, frak, frakbf, bb } {
206   \cs_set_eq:cc { math #1 } { sym #1 }
207 }
208
209 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn } #1 #2 {
210   \cs_set:Npx #1 {
211     \char_generate:nn {#2} {12}
212   }
213 }
214 \tl_map_inline:nn {\mathbin \mathclose \mathpunct \mathrel} {
215   \cs_new_eq:cc
216     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #1 :nn }
217     { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathord :nn }
218 }
219
220 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathop :nn } #1 #2 {
221   \exp_args:Nc \Umathchardef { \cs_to_str:N #1 op } 1~\symlummain #2~
222   \cs_set:Npx #1 {
223     \char_generate:nn {#2} {12}
224   }
225   \mathcode #2 = "8000~
226   \cs_set:cpx { \char_generate:nn {"FFFF"} {12} \char_generate:nn {#2} {12} } {
227     \__l_uni_math_is_integral_cp:wTF #2 { \DOTSI } { \DOTSB }
228     \use:c { \cs_to_str:N #1 op }
229     \__l_uni_math_is_integral_cp:wTF #2 { \ilimits@ } { \slimits@ }
230   }
231 }
232
233 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathopen :nn } #1 #2 {
234   \token_if_eq_meaning:NNTF #1 \sqrt {
235     \cs_set:Npx \sqrtsign {
236       \Uradical \symlummain #2~
237     }
238     \cs_set:Npx \root ##1 \of {
239       \Uroot \symlummain #2~ { ##1 }
240     }
241   }{
242     \cs_set:Npx #1 {
243       \char_generate:nn {#2} {12}
244     }
245   }

```

```

246 }
247
248 % For a \mathalpha command starting with \mup like \mupalpha this will be called as
249 % \__l_uni_math_uproot_assign_mup_char:nNn {alpha} \Alpha {"...}
250 \cs_new_protected:Npn \__l_uni_math_uproot_assign_mup_char:nNn #1 #2 #3 {
251   \cs_set:Npx #2 {
252     \symup {\char_generate:nn {#3} {12}}
253   }
254   \cs_set:cpx {#1} {
255     \char_generate:nn {#3} {12}
256   }
257 }
258
259 % For a \mathalpha command not starting with \mup this will be called as \__l_uni_math_uproot
260 \cs_new_protected:Npn \__l_uni_math_uproot_assign_nonmup_alpha:nNn #1 #2 #3 {
261   \cs_set:Npx #2 {
262     \char_generate:nn {#3} {12}
263   }
264 }
265
266 \group_begin:
267 \cs_set:Npn \l_tmp_cs:n #1 {
268   \group_end:
269
270   \cs_new_protected:Npn \__l_uni_math__check_mup_helper:w ##1 #1 ##2 \q_mark ##3 ##4 \q_stop
271     ##3 {##2}
272 }
273
274 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathalpha :nn } ##1 {
275   \exp_after:wN \__l_uni_math__check_mup_helper:w \token_to_str:N ##1 \q_mark \__l_uni_math
276 }
277 }
278
279 \exp_args:No \l_tmp_cs:n {
280   \token_to_str:N \mup
281 }
282
283 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathfence :nn } #1 #2 {
284   \cs_set:Npx #1 {
285     \char_generate:nn {#2} {12}
286   }
287   \cs_set:cpx {l \cs_to_str:N #1} {
288     \Udelimiter 4 ~ \symlummain #2 ~
289   }
290   \cs_set:cpx {r \cs_to_str:N #1} {
291     \Udelimiter 5 ~ \symlummain #2 ~
292   }
293 }
294
295 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccent :nn } #1 #2 {
296   \cs_set_protected:Npx #1 {
297     \Umathaccent fixed 0 ~ \symlummain #2 ~
298   }
299 }

```

```

300
301 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccent :nn } #1 #2 {
302   \cs_set:Npx #1 {
303     \Umathaccent bottom~fixed 0 ~ \symlummain #2 ~
304   }
305 }
306
307 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentwide :nn } #1 #2 {
308   \cs_set:Npx #1 {
309     \Umathaccent 0 ~ \symlummain #2 ~
310   }
311 }
312
313 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathbotaccentwide :nn } #1 #2 {
314   \cs_set:Npx #1 {
315     \Umathaccent bottom 0 ~ \symlummain #2 ~
316   }
317 }
318
319 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathaccentoverlay :nn } #1 #2 {
320   \cs_set:Npx #1 {
321     \Umathaccent overlay 0 ~ \symlummain #2 ~
322   }
323 }
324
325 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathover :nn } #1 #2 {
326   \cs_set:Npx #1 ##1 {
327     \mathop {
328       \Udelimiterover \symlummain #2 { ##1 }
329     }
330     \limits
331   }
332 }
333
334 \cs_new:cpn { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N \mathunder :nn } #1 #2 {
335   \cs_set:Npx #1 ##1 {
336     \mathop {
337       \Udelimiterunder \symlummain #2 { ##1 }
338     }
339     \limits
340   }
341 }
342
343 \cs_generate_variant:Nn \exp_args:Ne {c}
344 \cs_new:Npn \UnicodeMathSymbol #1 #2 #3 #4 {
345   \use:c { __l_uni_math_UnicodeMathSymbol_ \token_to_str:N #3 :nn }
346   {#2} {#1}
347 }
348 \input {unicode-math-table}
349 \cs_undefine:N \UnicodeMathSymbol
350
351 \cs_set_protected:Npn \triangle { \mathord { \bigtriangleup } }
352 \cs_set_protected:Npn \mathellipsis { \mathinner { \unicodeellipsis } }
353 \cs_set_protected:Npn \cdots { \mathinner { \unicodcdots } }

```



```

354
355 \clist_map_inline:nn {
356   \to \rightarrow,
357   \le \leq,
358   \ge \geq,
359   \neq \neq,
360   \bigcirc \mdlgwhtcircle,
361   \circ \vysmwhtcircle,
362   \bullet \smbkcircle,
363   \mathyen \yen,
364   \mathsterling \sterling,
365   \diamond \smwhtdiamond,
366   \emptyset \varnothing,
367   \hbar \hslash,
368   \land \wedge,
369   \lor \vee,
370   \owns \ni,
371   \gets \leftarrow,
372   \mathring \ocirc,
373   \not \neg,
374   \longdivision \longdivisionsign,
375   \backepsilon \upbackepsilon,
376   \eth \matheth,
377   \dotsb \cdots,
378   \@cdots \cdots,
379 } {
380   \cs_set_eq:NN #1
381 }
382
383 \cs_set_protected:cpx { \char_generate:nn {"FFFF"} {12} ' } {
384   \prime_helper:w "2032~
385 }
386
387 \cs_set_protected:Npn \uproot #1 {
388   \__l_uni_math_uproot:w #1 \scan_stop:
389 }
390
391 \cs_set_protected:Npn \leftroot #1 {
392   \__l_uni_math_leftroot:w #1 \scan_stop:
393 }

```

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.

```

394 \tl_const:Nn \c__l_uni_math_amsmath_cmds_tl {
395   \uproot
396   \leftroot
397   \iint
398   \iiint
399   \iiiiint
400   \dddot
401   \ddddot
402   \overleftarrow
403   \underrightarrow
404   \underleftarrow

```

```

405 \underleftrightharrow
406 \hat
407 \check
408 \tilde
409 \acute
410 \grave
411 \dot
412 \ddot
413 \breve
414 \bar
415 \vec
416 \mathring
417 \DOTSC
418 \DOTSI
419 \DOTSX
420 \DOTSB
421 \mdots@
422 }
423 \tl_const:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
424 \prod
425 \coprod
426 \bigwedge
427 \bigvee
428 \bigcap
429 \bigcup
430 \bigodot
431 \bigoplus
432 \bigotimes
433 \bigsqcup
434 \root
435 \int
436 \oint
437 \overrightarrow
438 \overleftarrow
439 }
440 \hook_gput_code:nnn { package/amsmath/before } { . } {
441 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
442 \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
443 \cs_undefine:N #1
444 }
445 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
446 \cs_new_eq:cN { __l_uni_math_saved_ \cs_to_str:N #1 } #1
447 }
448 \cs_set:Npn \varGamma { \temporary_definition_do_not_use }
449 }
450 \hook_gput_code:nnn { package/amsmath/after } { . } {
451 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_tl {
452 \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
453 \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
454 }
455 \tl_map_inline:Nn \c__l_uni_math_amsmath_cmds_defined_tl {
456 \cs_set_eq:Nc #1 { __l_uni_math_saved_ \cs_to_str:N #1 }
457 \cs_undefine:c { __l_uni_math_saved_ \cs_to_str:N #1 }
458 }

```

```
459 \cs_undefine:N \varGamma  
460 }
```