OpenType math font Fira

Herbert Voß

September 8, 2023

Contents

Abstract

The math font FIRA is derived from the Fira Sans and Fira Go sans serif. There are several math versions available (`https://github.com/Stone-Zeng/FiraMath/`) but only the regular version has from todays update all symbols.

1 Dependencies

The package needs an installed OpenType font `firamath.otf`. This can also be done by installing the package `firamath` from CTAN. [1]

2 Usage

`\usepackage[<options>]{firamath-otf}`

Optional arguments are

`fakebold` Use faked bold symbols

usefilenames Use filenames for the fonts instead of the symbolic font names

All other unknown options, e.g. `mathrm=sym` will be passed to the main package `unicode-math`.

The package itself loads by default

```
\RequirePackage{iftex,xkeyval,textcomp}
\RequirePackage{unicode-math}
```

3 The default regular weight

3.1 Version normal

$$\begin{aligned}
\frac{\partial \varrho}{\partial t} + \operatorname{div}(\varrho \vec{v}) &= 0 \\
\varrho \frac{\partial \vec{v}}{\partial t} + (\varrho \vec{v} \cdot \nabla)\vec{v} = \vec{f}_0 + \operatorname{div} \mathsf{T} &= \vec{f}_0 - \operatorname{grad} p + \operatorname{div} \mathsf{T}' \\
\varrho T \frac{\mathrm{d}s}{\mathrm{d}t} = \varrho \frac{\mathrm{d}e}{\mathrm{d}t} - \frac{p}{\varrho}\frac{\mathrm{d}\varrho}{\mathrm{d}t} &= -\operatorname{div} \vec{q} + \mathsf{T}' : \mathsf{D}
\end{aligned} \tag{1}$$

$$\frac{\partial}{\partial t} \iiint \varrho \, \mathrm{d}^3V + \oiint \varrho (\vec{v} \cdot \vec{v}\vec{n}) \, \mathrm{d}^2A = 0 \tag{2}$$

$$\frac{\partial}{\partial t} \iiint \varrho \vec{v} \, \mathrm{d}^3V + \oiint \varrho \vec{v} (\vec{v} \cdot \vec{n}\,) \, \mathrm{d}^2A = \iiint f_0 \, \mathrm{d}^3V + \oiint \vec{n} \cdot \mathsf{T} \, \mathrm{d}^2A \tag{3}$$

$$\begin{aligned}
\frac{\partial}{\partial t} \iiint \left(\frac{1}{2}v^2 + e\right) \varrho \, \mathrm{d}^3V + \oiint \left(\frac{1}{2}v^2 + e\right) \varrho \left(\vec{v} \cdot \vec{n}\,\right) \mathrm{d}^2A = \\
- \oiint \left(\vec{q} \cdot \vec{v}\vec{n}\right) \mathrm{d}^2A + \iiint \left(\vec{v} \cdot \vec{f}_0\right) \mathrm{d}^3V + \oiint \left(\vec{v} \cdot \vec{n}\, \mathsf{T}\right) \mathrm{d}^2A.
\end{aligned} \tag{4}$$

3.2 Version bold

The bold characters are created with the optional argument `fakebold` which loads the package `xfakebold` which writes some information into the created PDF to get bold characters. For more informations see the documentation of `xfakebold`.

$$\frac{\partial}{\partial t}\iiint \varrho \,\mathrm{d}^3V + \oiint \varrho(\vec{v}\cdot\vec{v}ecn)\,\mathrm{d}^2A = 0 \tag{5}$$

$$\frac{\partial}{\partial t}\iiint \varrho\vec{v}\,\mathrm{d}^3V + \oiint \varrho\vec{v}(\vec{v}\cdot\vec{n}\,)\,\mathrm{d}^2A = \iiint f_0\,\mathrm{d}^3V + \oiint \vec{n}\cdot\mathrm{T}\,\mathrm{d}^2A \tag{6}$$

$$\frac{\partial}{\partial t}\iiint \left(\frac{1}{2}v^2+e\right)\varrho\,\mathrm{d}^3V + \oiint \left(\frac{1}{2}v^2+e\right)\varrho\left(\vec{v}\cdot\vec{n}\,\right)\mathrm{d}^2A = \tag{7}$$
$$-\oiint \left(\vec{q}\cdot\vec{v}ecn\right)\mathrm{d}^2A + \iiint\left(\vec{v}\cdot\vec{f}_0\right)\mathrm{d}^3V + \oiint\left(\vec{v}\cdot\vec{n}\,\mathrm{T}\right)\mathrm{d}^2A.$$

4 Examples

4.1 Digits

- Digits: 0123456789
- Proportional digits: 0123456789
- Bold digits (`\symbf`): **0123456789**
- Bold proportional digits (`\symbf`): **0123456789**

4.2 Alphabets

- Latin letters (mathnormal):
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
- Latin upright letters (`\symup`):
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
- Latin typewriter letters (`\symtt`):
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
- Latin bold letters (`\symbf`):
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
- Latin bold upright letters (`\symbfup`):
  ABCDEFGHIJKLMNOPQRSTUVWXYZabcdefghijklmnopqrstuvwxyz
- Latin blackboard letters (`\symbb`):
  𝔸𝔹ℂ𝔻𝔼𝔽𝔾ℍ𝕀𝕁𝕂𝕃𝕄ℕ𝕆ℙℚℝ𝕊𝕋𝕌𝕍𝕎𝕏𝕐ℤ𝕒𝕓𝕔𝕕𝕖𝕗𝕘𝕙𝕚𝕛𝕜𝕝𝕞𝕟𝕠𝕡𝕢𝕣𝕤𝕥𝕦𝕧𝕨𝕩𝕪𝕫
- Greek letters:
  ΑΒΓΔΕΖΗΘΘΙΚΛΜΝΞΟΠΡΣΤΥΦΧΨΩαβγδεεζηθθικιλμνξοπρρσςτυφφχψω
- Greek upright letters (`\symup`):
  ΑΒΓΔΕΖΗΘΘΙΚΛΜΝΞΟΠΡΣΤΥΦΧΨΩαβγδεεζηθθικιλμνξοπρρσςτυφφχψω

- Greek bold letters (`\symbf`):
  $\boldsymbol{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta\Iota\Kappa\Lambda\Mu\Nu\Xi\Omicron\Pi\Rho\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega\alpha\beta\gamma\delta\varepsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\varsigma\sigma\tau\upsilon\phi\varphi\chi\psi\omega}$
- Greek bold upright letters (`\symbfup`):
  $\mathbf{\Alpha\Beta\Gamma\Delta\Epsilon\Zeta\Eta\Theta\Iota\Kappa\Lambda\Mu\Nu\Xi\Omicron\Pi\Rho\Sigma\Tau\Upsilon\Phi\Chi\Psi\Omega\alpha\beta\gamma\delta\varepsilon\zeta\eta\theta\iota\kappa\lambda\mu\nu\xi\omicron\pi\rho\varsigma\sigma\tau\upsilon\phi\varphi\chi\psi\omega}$
- Dotless letters:
  $\imath + \jmath + \imath + \jmath$
- Hebrew $\aleph + \beth + \gimel + \daleth$
- Ligature (text):
  ff fi fl ffi ffl
- Non-ligature (math):
  $ff \quad fi \quad fl \quad ffi \quad ffl + ff \quad fi \quad fl \quad ffi \quad ffl +$ ff fi fl ffi ffl
- Miscellaneous:
  $\hbar + \hbar +$ Å
  $\forall x > x_0,\ \exists \delta, \delta \in \varnothing$

4.3 Equations test

- Basic:
  $1 + 2 - 3 \times 4 \div 5 \pm 6 \mp 7 \dotplus 8 = -a \oplus b \otimes c$
- Binary relations $x + - \oplus \otimes \ominus \odot \oslash \cdot \cdot \times \div y$
- Set theory $A \cap B \cup C \sqcap D \sqcup R \uplus k \cup l \uplus m$
  $A \subset B \supset C \subseteq D \supseteq E \quad F \quad G + A \sqsubset B \sqsupset C \sqsubseteq D \sqsupseteq E$
  $\complement_U A \cup \complement_C C \subset \complement_U A \cup \complement_C C \in R \in Q \ni Z \ni N$
- Superscript and subscript:
  $2^2 + 2^{2^2} + 2^{2^{2^2}} + 2^{2^2} + x_a + x_{a_i} + x_{a_{i_1}}$
- Arrows:
  $x \leftarrow y \rightarrow z \leftrightarrow w \nleftarrow y \nrightarrow z \nleftrightarrow w \Leftarrow a \Rightarrow b \Leftrightarrow c \nLeftarrow a \nRightarrow b \nLeftrightarrow c$
  $x \uparrow y \downarrow z \updownarrow w \Uparrow a \Downarrow b \Updownarrow c$
  $p \nwarrow p \nearrow p \searrow p \swarrow p \nwarrow p \nearrow p \searrow p \swarrow p$
  $x \leftharpoonup x \leftharpoondown x \upharpoonright x \upharpoonleft x \rightharpoonup x \rightharpoondown x \downharpoonleft x \downharpoonright x$
  $A \longleftarrow B \longrightarrow C \longleftrightarrow D \Longleftarrow E \Longrightarrow F \Longleftrightarrow G$
  $X \mapsfrom Y \mapsto Z \updownarrow W \downarrow P \Mapsfrom S \Mapsto R$
  $M \longmapsfrom N \longmapsto O \Longmapsfrom K \Longmapsto L$
  $f \rightleftarrows f \upuparrows f \leftrightarrows f \downdownarrows g \rightrightarrows g \upuparrows g \leftleftarrows g \downdownarrows h \rightrightarrows h \leftleftarrows p \leftrightarrows p \rightleftharpoons p \upharpoonleft\downharpoonright p \downharpoonleft\upharpoonright p$
- Math accents:

$$\acute{x}\ \grave{x}\ \check{x}\ \hat{x}\ \bar{x}\ \breve{x}\ \mathring{x}\ \dot{x}\ \ddot{x}\ \dddot{x}\ \ddddot{x}\ \tilde{x}\ \vec{x}\ \vec{\vec{x}}\ \tilde{x}\ \vec{x}\ \tilde{x}\ \overset{*}{x}\ \not{x}\ \not{x}\ \overline{x}\ \hat{x}\ \tilde{x}\ \bar{x}\ \underline{x}\ \underline{\underline{x}}\ \underline{\ddot{x}}\ \underline{\tilde{x}}\ \underline{\vec{x}}\ \underline{\vec{\vec{x}}}$$

- Integral:

$$\int_0^\pi \sin x \, \mathrm{d}x = \int\limits_0^\pi \sin x \, \mathrm{d}x = \cos 0 - \cos \pi = 2$$

$$\int_{-\infty}^{+\infty} \mathrm{d}z \iint_{-\infty}^{+\infty} \mathrm{d}^2 y \iiint_{-\infty}^{+\infty} \mathrm{d}^3 x \iiiint_{-\infty}^{+\infty} \mathrm{d}^4 p$$

$$\oint \mathrm{d}r \oiint \mathrm{d}\theta \oiiint \mathrm{d}\varphi$$

$$\int_0^\pi \sin x \, \mathrm{d}x = \int\limits_0^\pi \sin x \, \mathrm{d}x = \cos 0 - \cos \pi + C$$

$$\int_{-\infty}^{+\infty} \mathrm{d}z \iint_{-\infty}^{+\infty} \mathrm{d}^2 y \iiint_{-\infty}^{+\infty} \mathrm{d}^3 x \iiiint_{-\infty}^{+\infty} \mathrm{d}^4 p$$

$$\oint \mathrm{d}r \oiint \mathrm{d}\theta \oiiint \mathrm{d}\varphi$$

- Huge operators:

$$\int\limits_0^\infty \int_0^\infty \sum_{i=1}^\infty \prod_{j=i}^\infty \coprod_{k=i}^\infty$$

$$\sum_{i=1}^\infty \frac{1}{x^i} = \frac{1}{1-x} \quad \prod_{i=1}^\infty \frac{1}{x^i} = x^{-n(n+1)/2} \quad \coprod_{i=i}^\infty \frac{1}{x^i} = ?$$

- Huge operators (inline):

$$\int\limits_0^\infty \int_0^\infty \iint \mathrm{d}x \iiint \mathrm{d}y \iiiint \mathrm{d}p \oint \mathrm{d}r \oiint \mathrm{d}\theta \oiiint \mathrm{d}\varphi \sum_{i=1}^\infty \prod_{j=i}^\infty \coprod_{i=i}^\infty$$

- Huge operators (inline):

$$\int\limits_0^\infty \int_0^\infty \iint \mathrm{d}x \iiint \mathrm{d}y \iiiint \mathrm{d}p \oint \mathrm{d}r \oiint \mathrm{d}\theta \oiiint \mathrm{d}\varphi \sum_{i=1}^\infty \prod_{j=i}^\infty \coprod_{i=i}^\infty$$

- Fraction:

$$\frac{1}{2} + \frac{1}{\frac{2}{3} + 4} + \frac{\frac{1}{2} + 3}{4}$$

- Fraction (inline):

$$\frac{1}{2} + \frac{1g}{2} + \frac{1}{\frac{2}{3} + 4} + \frac{\frac{1}{2} + 3}{4}$$

- Radical:

$$\sqrt{2} + \sqrt{2^2} + \sqrt{1 + \sqrt{2}} + \sqrt{1 + \sqrt{1 + \sqrt{3}}} + \sqrt{\sqrt{\sqrt{\sqrt{2}}}} + \sqrt{\frac{1}{2}}$$

$$\sqrt[3]{2} + \sqrt[3]{2^2} + \sqrt[3]{1 + \sqrt[3]{2}} + \sqrt[3]{1 + \sqrt[3]{1 + \sqrt[3]{3}}} + \sqrt[3]{\sqrt[3]{\sqrt[3]{\sqrt[3]{2}}}} + \sqrt[3]{\frac{1}{2}}$$

$$\sqrt[4]{2} + \sqrt[4]{2^2} + \sqrt[4]{1 + \sqrt[4]{2}} + \sqrt[4]{1 + \sqrt[4]{1 + \sqrt[4]{3}}} + \sqrt[4]{\sqrt[4]{\sqrt[4]{\sqrt[4]{2}}}} + \sqrt[4]{\frac{1}{2}}$$

$$\sqrt[x]{y} + \sqrt[x]{\sqrt[x]{y}} + \sqrt[x]{\sqrt[x]{\sqrt[x]{y}}} + \sqrt[x]{\frac{1}{2}} + \sqrt{\begin{matrix}x\\y\\z\\w\end{matrix}} + \sqrt[3]{\begin{matrix}x\\y\\z\\w\end{matrix}} + \sqrt[4]{\begin{matrix}x\\y\\z\\w\end{matrix}} + \sqrt[x]{\begin{matrix}x\\y\\z\\w\end{matrix}} + \sqrt{\begin{matrix}x\\y\\z\\w\\p\end{matrix}} + \sqrt[3]{\begin{matrix}x\\y\\z\\w\\p\end{matrix}} + \sqrt[4]{\begin{matrix}x\\y\\z\\w\\p\end{matrix}} + \sqrt[x]{\begin{matrix}x\\y\\z\\w\\p\end{matrix}}$$

$$\sqrt{x}}}}}}}}}}}}}}}}}}}}}}}}}$$

$$\sqrt[3]{x}}}}}}}}}}}}}}}}}}}}}}}}}$$

$$\sqrt[4]{x}}}}}}}}}}}}}}}}}}}}}}}}}$$

$$\sqrt[x]{\sqrt[x]{\sqrt[x]{\sqrt[x]{x}}}}$$

- Brackets:

$$(a)(A)(O)(Y)(y)(f)(Q)(T)(Y)(j)(q)$$

$$\left(\left(\left((x)\right)\right)\right) \quad \left(\left(\left((x)\right)\right)\right) \quad \left[\left[\left[[x]\right]\right]\right] \quad \left\{\left\{\left\{\{x\}\right\}\right\}\right\}$$

$$(x) + \left(x^2\right) + \left(\frac{1}{2}\right) + \left(\frac{2^2}{3}\right) + \left(\begin{matrix}\frac{1}{2}\\ \frac{3}{4}\end{matrix}\right)$$

$$(|)[\|]\{\|\} \quad (|)[\|]\{\|\} \quad (|)[\|]\{\|\} \quad (|)[\|]\{\|\} \quad (|)[\|]\{\|\} \quad \left(\left|\right|\right)\left[\left\|\right\|\right]\left\{\left\|\right\|\right\} \quad \left(\left|\right|\right)\left[\left\|\right\|\right]\left\{\left\|\right\|\right\}$$

- More brackets:

$$\lceil ceiling \rceil \quad \lfloor floor \rfloor \quad (group)$$

- Bra-kets:

$$\langle x| + |x\rangle + \langle \alpha|\beta\rangle + \left|\alpha^2\right\rangle\left\langle\beta^2\right| + \left\langle\frac{1}{2}\right| + \left|\frac{1}{2}\right\rangle + \left\langle\frac{1}{2}\middle|\frac{1}{2}\right\rangle + \left|\frac{1}{2}\right\rangle\left\langle\frac{1}{2}\right| + \left\langle\frac{a^2}{b^2}\right| + \left|\frac{\mathrm{e}^{x^2}}{\mathrm{e}^{y^2}}\right\rangle$$

$$\langle|\rangle \quad \langle|\rangle \quad \langle|\rangle \quad \left\langle\left|\right|\right\rangle \quad \left\langle\left|\right|\right\rangle \quad \langle\!\langle|\rangle\!\rangle \quad \langle\!\langle|\rangle\!\rangle \quad \langle\!\langle|\rangle\!\rangle \quad \left\langle\!\left\langle\left|\right|\right\rangle\!\right\rangle$$

- Matrices:

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} + \begin{pmatrix} a & b \\ c & d \end{pmatrix}$$

$$\begin{pmatrix} a & b & c & d \\ x & y & z & w \end{pmatrix} \quad \begin{bmatrix} a & b & c & d \\ x & y & z & w \end{bmatrix} \quad \begin{Bmatrix} a & b & c & d \\ x & y & z & w \end{Bmatrix} \quad \begin{vmatrix} a & b & c & d \\ x & y & z & w \end{vmatrix} \quad \begin{Vmatrix} a & b & c & d \\ x & y & z & w \end{Vmatrix}$$

$$\begin{pmatrix} a & b & c & d \\ k & l & m & n \\ x & y & z & w \end{pmatrix} \quad \begin{bmatrix} a & b & c & d \\ k & l & m & n \\ x & y & z & w \end{bmatrix} \quad \begin{Bmatrix} a & b & c & d \\ k & l & m & n \\ x & y & z & w \end{Bmatrix} \quad \begin{vmatrix} a & b & c & d \\ k & l & m & n \\ x & y & z & w \end{vmatrix} \quad \begin{Vmatrix} a & b & c & d \\ k & l & m & n \\ x & y & z & w \end{Vmatrix}$$

$$\begin{pmatrix} a & b & c & d \\ k & l & m & n \\ p & q & s & t \\ x & y & z & w \end{pmatrix} \quad \begin{bmatrix} a & b & c & d \\ k & l & m & n \\ p & q & s & t \\ x & y & z & w \end{bmatrix} \quad \begin{Bmatrix} a & b & c & d \\ k & l & m & n \\ p & q & s & t \\ x & y & z & w \end{Bmatrix} \quad \begin{vmatrix} a & b & c & d \\ k & l & m & n \\ p & q & s & t \\ x & y & z & w \end{vmatrix} \quad \begin{Vmatrix} a & b & c & d \\ k & l & m & n \\ p & q & s & t \\ x & y & z & w \end{Vmatrix}$$

- Nablas:

$$\nabla x + \nabla f + \nabla \cdot \boldsymbol{u} + \nabla \times \mathbf{v}$$

$$\nabla \quad \boldsymbol{\nabla} \quad \nabla \quad \boldsymbol{\nabla}; \quad \tilde{\nabla} \quad \tilde{\boldsymbol{\nabla}} \quad \tilde{\nabla} \quad \tilde{\boldsymbol{\nabla}}$$

- Over-/underline and over-/underbraces

$$\overline{b}\quad \overline{ab}\quad \overline{abc}\quad \overline{abcd}\quad \overline{abcde}\quad \overline{a+b+c}\quad \overline{x_1, x_2, \dots, x_n}$$

$$\overparen{b}\quad \overparen{ab}\quad \overparen{abc}\quad \overparen{abcd}\quad \overparen{abcde}\quad \overparen{a+b+c}\quad \overbrace{x_1, x_2, \dots, x_n}^{n}$$

$$\overline{b}\quad \overline{ab}\quad \overline{abc}\quad \overline{abcd}\quad \overline{abcde}\quad \overline{a+b+c}\quad \overline{x_1, x_2, \dots, x_n}^{n}$$

$$\overbrace{b}\quad \overbrace{ab}\quad \overbrace{abc}\quad \overbrace{abcd}\quad \overbrace{abcde}\quad \overbrace{a+b+c}\quad \overbrace{x_1, x_2, \dots, x_n}^{n}$$

$$\underline{b}\quad \underline{ab}\quad \underline{abc}\quad \underline{abcd}\quad \underline{abcde}\quad \underline{a+b+c}\quad \underline{x_1, x_2, \dots, x_n}$$

$$\underparen{b}\quad \underparen{ab}\quad \underparen{abc}\quad \underparen{abcd}\quad \underparen{abcde}\quad \underparen{a+b+c}\quad \underbrace{x_1, x_2, \dots, x_n}_{n}$$

$$\underline{b}\quad \underline{ab}\quad \underline{abc}\quad \underline{abcd}\quad \underline{abcde}\quad \underline{a+b+c}\quad \underline{x_1, x_2, \dots, x_n}_{n}$$

$$\underbrace{b}\quad \underbrace{ab}\quad \underbrace{abc}\quad \underbrace{abcd}\quad \underbrace{abcde}\quad \underbrace{a+b+c}\quad \underbrace{x_1, x_2, \dots, x_n}_{n}$$

- Primes

$$x' x'' x''' x'''' x^{x'} x^{x''} x^{x'''} x^{x''''} x^{x`}$$

$$x' x'' x''' x''''$$

$$x' x'' x''' x''''$$

```
\lim\limits_{x\to\infty} \frac{1}{x^2} = 0
```

$$\lim_{x\to\infty} \frac{1}{x^2} = 0$$

```
\frac{\partial y(x)}{\partial x} = \frac{\symup{d}y(x)}{\symup{d}x} = y'(x)
```

$$\frac{\partial y(x)}{\partial x} = \frac{\mathrm{d}y(x)}{\mathrm{d}x} = y'(x)$$

References

[1] Xiangdong Zeng. *The `firamath` package. Fira sans serif font with Unicode math support*. Version 0.3.4. Oct. 15, 2020. URL: `https://ctan.org/pkg/firamath`.