GNU TEXmacs: a scientic editing platform

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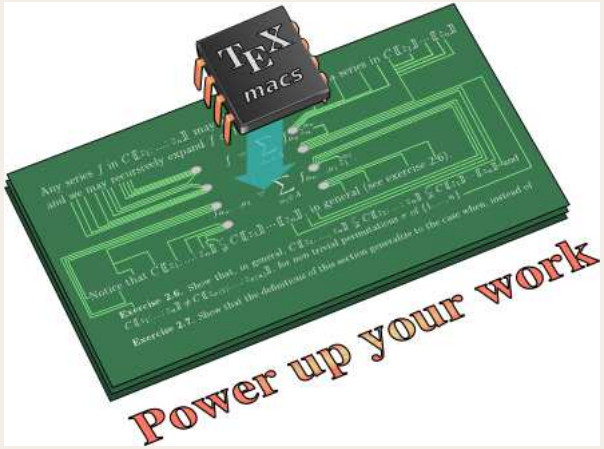

ICM 2006

http://www.texmacs.org

Why TEXMACS?

A scientific editing platform combines:

- Polyvalent & user-friendly editors for scientific documents & data.
  - Mathematical formulas.
  - Technical pictures.
  - Typed hyperlinks and annotations.
- Possibility to interface the editor with a range of extern software.
  - Interfaces with computer algebra systems.
  - Tools for scientific visualization.
  - Spell checker.
- Common transversal editing tools.
  - Integrated help system.
  - Ergonomy and typesetting quality.
  - Undo, redo, version control.
  - Remote tools like a wiki.

  - Presentation mode.
  - Import/Export
- Customization and extensability.
  - User provided style files.
  - Scriptability via an extension language.

First steps

Example paper (LaTeX export, after compilation, XHTML/MathML)

Concrete typing

- Style, language.
- Title, section, theorem.
- Mathematics, symbols, common constructs, matrices.
- Graphics.
- Links.

Computer algebra

⇑ A simple MAXIMA session

```
(C1) diff(x^x^x,x,3);
(C2) expand(integrate(d1,x));
(C4)
```

⇑ Mathematical input

(C4) $\text{integrate}\left(\frac{x^5+x-1}{x^2-3}, x\right);$

(C7) $\text{expand}\left(\text{diff}\left(-\frac{\log\left(\frac{2x-2\sqrt{3}}{2x+2\sqrt{3}}\right)}{2\sqrt{3}}+5\log\left(x^2-3\right)+\frac{x^4+6x^2}{4}, x\right)\right);$

(C9)

⇑ Integrated documentation

```
(C9) plot3d([cos(x)*(3+y*cos(x/2)),sin(x)*(3+y*cos(x/2)),y*sin(x/2)],
        [x,-%pi,%pi],[y,-1,1],['grid,50,15])
(C10)
```

⇑ Interoperability – Pari side

pari] $(x+y+z)^{10}$

pari]

⇑ Interoperability – Maxima side

(C9)

Computer algebra in the background

Computer-aided typing

Hallo $1+1$

$$\begin{pmatrix} 1 & 1 & 1 \\ a & b & c \\ a^2 & b^2 & c^2 \end{pmatrix}$$

Graphics

Plot surface

Function

f: $\sin(x+y^2)$

Range

x: $-2\,\pi$ – $2\,\pi$

y: -2 – 2

Transversal tools

- Undo / Redo.
- Remote tools.
- Presentation mode.
- Conversions.
- Structured editing (search, variants, navigation, etc.).

$\langle$assign$|cd|$

$$\langle \text{macro}|A|B|C|D| \begin{array}{ccc} A & \longrightarrow & B \\ \downarrow & & \downarrow \\ C & \longrightarrow & D \end{array} \rangle\rangle$$

$$\langle \text{cd}|A \oplus B|X|Y|C \otimes D\rangle$$

The SCHEME extension language

$$a + \frac{\sqrt{x+y}}{a+b} + c$$

```
scheme] (select (buffer-tree) '(:* (:match (frac :1 (sqrt :1)))))
```

```
scheme] (define t
          (car (select (buffer-tree)
                       '(:* (:match (frac :1 (sqrt :1)))))))
```

```
scheme] (tree-set! t `(frac ,(tree-ref t 1) ,(tree-ref t 0)))
```

```
scheme] (tm-define (kbd-return)
          (:inside frac)
          (with-innermost t 'frac
            (tree-set! t `(frac ,(tree-ref t 1) ,(tree-ref t 0)))
            (tree-go-to t 0 :start)))
```

```
scheme]
```