GNU TeXmacs: a scientific editing platform

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http://www.texmacs.org
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.
A simple Maxima session

(C1) \text{diff}(x^x^x,x,3);

(C2) \text{expand}(\text{integrate}(d1,x));

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(x^2 - 3) + \frac{x^4 + 6x^2}{4}, x\right)\right);

Integrated documentation

(C9) \text{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],[\text{'grid},50,15])

Interoperability – Pari side

pari] (x + y + z)^10

pari]

Interoperability – Maxima side
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

<table>
<thead>
<tr>
<th>Function</th>
<th>$f$: $\sin(x + y^2)$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>$x$: $-2\pi$ to $2\pi$</td>
</tr>
<tr>
<td></td>
<td>$y$: $-2$ to $2$</td>
</tr>
</tbody>
</table>
Transversal tools

- Undo / Redo.
- Remote tools.
- Presentation mode.
- Conversions.
- Structured editing (search, variants, navigation, etc.).
\[ \langle \text{assign} \mid cd \rangle \]

\[ A \quad \rightarrow \quad B \]

\[ \langle \text{macro} \mid A \mid B \mid C \mid D \mid \downarrow \quad \downarrow \quad \rangle \]

\[ C \quad \rightarrow \quad D \]

\[ \langle \text{cd} \mid A \oplus B \mid X \mid Y \mid C \otimes D \rangle \]
The **Scheme** extension language

\[
a + \frac{\sqrt{x + y}}{a + b} + c
\]

<table>
<thead>
<tr>
<th>Scheme</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheme</td>
<td><code>(select (buffer-tree) '(* (:match (frac :1 (sqrt :1)))))</code></td>
</tr>
</tbody>
</table>
| 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)))` |