1 Introduction

This package is a modest alternative to the `pst-osci` package (not maintained anymore). It allows you to draw oscilloscope "screen shots" with \LaTeX, TikZ and pgfplots.

Contact

Some features are not implemented yet, but the package is already usable for basic representations. I’m doing this for fun and still learning how to make \LaTeX packages. Therefore, I’m open to any suggestion or contribution :

contact at ensciences dot fr

Issues tracker

An issues tracker is available at :

https://framagit.org/ThibGiauffret/latex_packages/-/issues

Feel free to report any bug you find or send suggestions.

Important note : Please indicate the concerned package name in the title of the issue. For example, if you want to report an issue about this package, please use the following title : [tikz-osci] My issue report title.

2 Usage

The package is loaded with the command \usepackage{tikz-osci}. It defines a single command, \osci, which takes a list of options as argument. The options allow you to configure and customize the oscilloscope screen view :
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Default</th>
</tr>
</thead>
<tbody>
<tr>
<td>scale</td>
<td>Scale of the oscilloscope (with scalebox).</td>
<td>1</td>
</tr>
<tr>
<td>rounded corners</td>
<td>Radius of the oscilloscope corners (in pt).</td>
<td>10</td>
</tr>
<tr>
<td>second channel</td>
<td>1 if the second channel is enabled, 0 otherwise.</td>
<td>0</td>
</tr>
<tr>
<td>screen offset one</td>
<td>Vertical screen offset of the first channel.</td>
<td>0</td>
</tr>
<tr>
<td>screen offset two</td>
<td>Vertical screen offset of the second channel.</td>
<td>0</td>
</tr>
<tr>
<td>time div</td>
<td>Time division (in ms).</td>
<td>20</td>
</tr>
<tr>
<td>voltage div one</td>
<td>Voltage division of the first channel (in V).</td>
<td>1</td>
</tr>
<tr>
<td>voltage div two</td>
<td>Voltage division of the second channel (in V).</td>
<td>1</td>
</tr>
<tr>
<td>sample rate</td>
<td>Sample rate.</td>
<td>200</td>
</tr>
<tr>
<td>xy mode</td>
<td>1 if the oscilloscope is in XY mode (Lissajous curve), 0 otherwise.</td>
<td>0</td>
</tr>
<tr>
<td>math mode</td>
<td>1 for addition, 2 for subtraction, 3 for multiplication, 4 for division, 0 otherwise. xy mode option must be set to 0.</td>
<td>0</td>
</tr>
<tr>
<td>math mode hide source</td>
<td>0 to display channels CH1 and CH2 with the third channel, 1 to hide them.</td>
<td>0</td>
</tr>
<tr>
<td>func one</td>
<td>Expression of the first channel (pgf maths format). Trigonometric functions are defined in degrees.</td>
<td>$2 \sin(2 \cdot 180/0.020 \cdot x)$</td>
</tr>
<tr>
<td>func two</td>
<td>Expression of the second channel (pgf maths format). Trigonometric functions are defined in degrees.</td>
<td>$1 \sin(2 \cdot 180/0.020 \cdot x) + 0.2 \sin(2 \cdot 180/0.040 \cdot x)$</td>
</tr>
<tr>
<td>indicators</td>
<td>1 if the channel indicators are enabled, 0 otherwise.</td>
<td>1</td>
</tr>
<tr>
<td>horizontal cursor one</td>
<td>Horizontal position of the first cursor (between -4 and 4). false to disable.</td>
<td>false</td>
</tr>
<tr>
<td>horizontal cursor two</td>
<td>Horizontal position of the second cursor (between -4 and 4). false to disable.</td>
<td>false</td>
</tr>
<tr>
<td>vertical cursor one</td>
<td>Vertical position of the first cursor (between -4 and 4). false to disable.</td>
<td>false</td>
</tr>
<tr>
<td>vertical cursor two</td>
<td>Vertical position of the second cursor (between -4 and 4). false to disable.</td>
<td>false</td>
</tr>
<tr>
<td>cursor precision</td>
<td>Number of digits after the decimal point for the cursor values.</td>
<td>1</td>
</tr>
<tr>
<td>color one</td>
<td>Color of the first channel (in hexadecimal).</td>
<td>D62626</td>
</tr>
<tr>
<td>color text one</td>
<td>Text color of the first channel (in hexadecimal).</td>
<td>FFFFFF</td>
</tr>
<tr>
<td>color two</td>
<td>Color of the second channel (in hexadecimal).</td>
<td>1053AF</td>
</tr>
<tr>
<td>color text two</td>
<td>Text color of the second channel (in hexadecimal).</td>
<td>FFFFFF</td>
</tr>
<tr>
<td>color three</td>
<td>Color of the XY mode and the math mode (in hexadecimal).</td>
<td>2E8B73</td>
</tr>
<tr>
<td>color text three</td>
<td>Text color of the XY mode and the math mode (in hexadecimal).</td>
<td>FFFFFF</td>
</tr>
<tr>
<td>graph back color</td>
<td>Background color of the graph (in hexadecimal).</td>
<td>FFFFFF</td>
</tr>
<tr>
<td>info back color</td>
<td>Background color of the information box (in hexadecimal).</td>
<td>D6D6D6</td>
</tr>
<tr>
<td>info text color</td>
<td>Text color of the information box (in hexadecimal).</td>
<td>000000</td>
</tr>
<tr>
<td>main axis color</td>
<td>Color of the main axis (in hexadecimal).</td>
<td>000000</td>
</tr>
<tr>
<td>grid color</td>
<td>Color of the grid (in hexadecimal).</td>
<td>CCCCCC</td>
</tr>
</tbody>
</table>
A quick documentation in french is available here:

https://www.ensciences.fr/read.php?article=1220

3 Examples

For more examples, see the tikz-osci-example.tex file.

Two channels plot with custom background color

```latex
\osci[
  scale=0.7,
  second channel=1,
  screen offset one=2,
  screen offset two=-2,
  time div=20,
  voltage div one=4,
  voltage div two=1,
  sample rate=200,
  xy mode=0,
  func one=2*sin(2*180/0.020*x),
  func two=1*sin(2*180/0.020*x) + 0.2*sin(2*180/0.040*x),
  color one=D62626,
  color two=1053AF,
  graph back color=669966,
  info back color=D6D6D6,
  grid color=CCCCCC
]
```

Lissajous curve (XY mode) and no rounded corner

```latex
\osci[
  scale=0.7,
  rounded corners=0,
  second channel=1,
  time div=300,
  voltage div one=1,
  voltage div two=0.5,
  sample rate=500,
  xy mode=1,
  func one=sin(7*x),
  func two=sin(2*x),
  indicators=1,
  graph back color=FFFFFF,
  info back color=D6D6D6,
  info text color=000000,
  main axis color=000000,
  grid color=CCCCCC,
]
```
Math mode (multiply) with hidden sources and dark mode

\osci[
    scale=0.7,
    second channel=1,
    time div=10,
    voltage div one=2,
    voltage div two=2,
    sample rate=500,
    xy mode=0,
    math mode=3,
    math mode hide source=1,
    func one=2*sin(2*180/0.040*x),
    func two=3*sin(2*180/0.005*x),
    indicators=0,
    color three=F0DE25,
    color text three=000000,
    graph back color=777799,
    info back color=333333,
    info text color=FFFFFF,
    main axis color=DDDDDD,
    grid color=CCCCCC,
]

Common periodic signals

% Square wave function
\pgfmathdeclarefunction{square}{4}{%
    \pgfmathparse{(sin(2*180*x/#2+#4) + #3>0?#1:-#1)}%
}
%
% Triangle wave function
\pgfmathdeclarefunction{triangle}{4}{%
    \pgfmathparse{#1*asin(sin(2*180/#2*x + #4))/90}%
}
%
\osci[
    scale=0.7,
    second channel=1,
    sample rate=1000,
    time div=100,
    func one={triangle(2,0.2,0,0)},
    func two={square(2,0.2,0,0)},
    smooth one = 1,
    smooth two = 0,
]
4 License

This package is distributed under the terms of the LaTeX Project Public License (LPPL), version 1.3c or later. The latest version of this license is available at [http://www.latex-project.org/lppl.txt](http://www.latex-project.org/lppl.txt).

5 Credits

This package requires the following packages:

- xcolor maintained by the LaTeX3 Project (license LPPL 1.3c);
- tikz maintained by the TikZ and PGF Project (license LPPL 1.3c);
- pgfkeys maintained by the Till Tantau (license LPPL);
- pgfplots maintained by the Christian Feuersänger (license LPPL).

6 Changelog

- **0.4.0** (2023/10/24):
  
  Added cursor and smooth options.
  
  Added square and triangle plot examples.
  
  Fixed the pgf keys declaration.

- **0.3.0** (2023/10/08):
  
  Implemented XY mode and math (add, subtract, multiply, divide) functionalities.

- **0.2.0** (2023/10/07):
  
  Added color text one, color text two and color text xy options.
  
  Added indicators option.
  
  Added rounded corners option.
  
  Fixed the main axis color not being applied.
  
  Reworded the documentation and the example file.
- **0.1.1** (2023/10/06):
  - Renamed sub axis color to grid color.
  - Renamed expr one and expr two to func one and func two.
  - Updated package files names.

- **0.1.0** (2023/10/06): Initial release. XY mode not implemented yet.