luamesh: compute and draw meshes with LuaLaTeX

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The package luamesh allows to compute and draw 2D triangulation of Delaunay. The algorithm is written with lua, and depending of the choice of the "engine", the draw is done by MetaPost (with luamplib) or by tikz.

The Delaunay triangulation algorithm is the Bowyer and Watson algorithm. Several macros are provided to draw the global mesh, the set of points, a particular step of the algorithm.

1 Installation

1.1 With Linux

To install luamesh with TeXlive, you have to create the local texmf directory in your home.

```
user $> mkdir ~/texmf
```

Then we have to files to place in the correct directories. First, the luamesh.sty file must be in the directory:

~/texmf/tex/latex/luamesh/

and secondly, the luamesh.lua must be in the directory:

~/texmf/scripts/luamesh/

Once you have done this, luamesh can be included in your document with

```
\usepackage{luamesh}
```

1.2 Dependencies

This package is built upon two main packages to draw the triangulations :

1. luamplib to use MetaPost via the LuaTEX library mplib;
2. or tikz.

We will see how to choose between these two *drawing engines*.

Moreover, the following packages are necessary:

1. xkeyval to manage the optional arguments;
2. xcolor to use colors (needed by luamplib);
3. ifthen to help the programming with TEX.

2 The Basic Macros

If you want to use this package, you must compile your document with lualatex:

```
user $>   lualatex mylatexfile.tex
```

Let us recall that this package provides macros to draw two dimensional triangulations (or meshes).

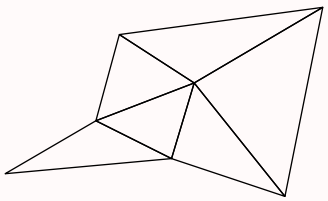
2.1 Draw a Complete Mesh

\buildMeshBW[⟨*options*⟩]{⟨*list of points*⟩ or ⟨*file name*⟩}

This macro produce the Delaunay triangulation (using the Bowyer and Watson algorithm) of the given ⟨*list of points*⟩. The list of points must be given in the following way :

(x1,y1);(x2,y2);(x3,y3);...;(xn,yn)

```
\buildMeshBW{(0.3,0.3);(1.5,1);(4,0);(4.5,2.5);(1.81,2.14);(2.5,0.5);(2.8,1.5)}
```



2.1.1 The Options

There are several options to customize the drawing.

`mode = int (default) or ext:` the mode option allow to use either the previously described set of point in the argument, or a file, containing, line by line (2 columns), the points. Such a file looks like :

```
x1  y1
x2  y2
x3  y3
...
xn yn
```

2.2 Draw the Set of Points

`\tracePointsMesh[`⟨*options*⟩`]{`⟨*list of points*⟩ or ⟨*file name*⟩`}`

2.3 Draw a Step of the Bowyer and Watson Algorithm

`\meshAddPointBW[`⟨*options*⟩`]{`⟨*list of points*⟩ or ⟨*file name*⟩`}{`⟨*point*⟩ or ⟨*number of line*⟩`}`

3 The *inc* Macros

4 Gallery of Examples