

Mesh generation via triangle – short tutorial

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Note: The following short tutorial will only work under Linux.

Installation

Download triangle (the zip-file) from the page

<http://www.cs.cmu.edu/~quake/triangle.html>

and put it in a new folder. Extract the containing files using the command `unzip ./triangle.zip`. You should get the following files

```
A.poly makefile README showme.c triangle.c
triangle.h triangle.zip tricall.c
```

In order to compile these into executable files type `make` which should create two executable files `triangle` and `showme`. The program `triangle` is for mesh generation, whereas `showme` with plot a generated mesh.

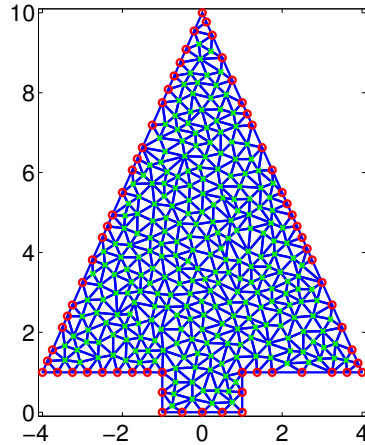
Congratulations, installation finished.

Mesh generation

In contrast to MATLABs `delaunay` triangle is a versatile “Two-Dimensional Quality Mesh Generator and Delaunay Triangulator.” It can easily handle non-convex domains, returns boundary edges and boundary markers, features sub-parametric elements (for experts) etc.

For mesh generation the normal procedure is that you first create a `.poly` file, from which you then generate your triangulation. If you call `triangle -h` you get an extensive list of options and a documentation. In particular input and output formats `.poly`, `.node` and `.ele` are specified. It is useful to read and understand the specification of the `.node` input file.

Example



The simple Christmas tree below was generated using the command

```
./triangle -Dqa0.1 xmas.poly
```

with the file `xmas.poly` which looks like this

```
# simple Xmas tree, Dirk Peschka
# 7 points, 2 dimension, 0 attributes, 1 boundary marker
7 2 0 1
# tree vertices, vertex number, x position, y position, marker
1 1 0 0
2 1 1 0
3 4 1 0
4 0 10 0
5 -4 1 0
6 -1 1 0
7 -1 0 0
# 7 segments, 1 boundary marker
7 1
# segment number, node 1, node 2, segment marker
1 1 2 1
2 2 3 1
3 3 4 1
4 4 5 1
5 5 6 1
6 6 7 1
7 7 1 1
# no hole
0
```

At the ISIS 2 page you might download the file `readtriamesh.m` which contains the function `[x,y,npoint,nelement,e2p,id] = readtriamesh(fname)`. The function reads a simple triangle mesh in the format we are going to use. For example the Christmas tree can be loaded using `fname = 'xmas.1'`. The plot is generated using the `plotmesh.m` from the assignment.