3-Connected Planar Graphs into PSLG

Using Tutte’s Embedding

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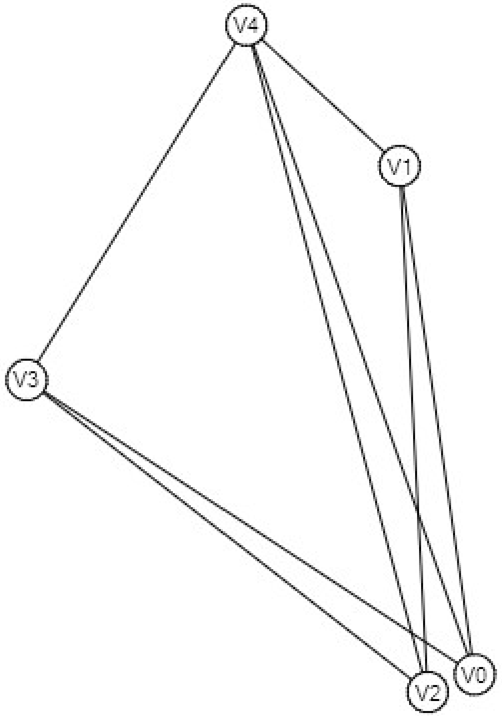
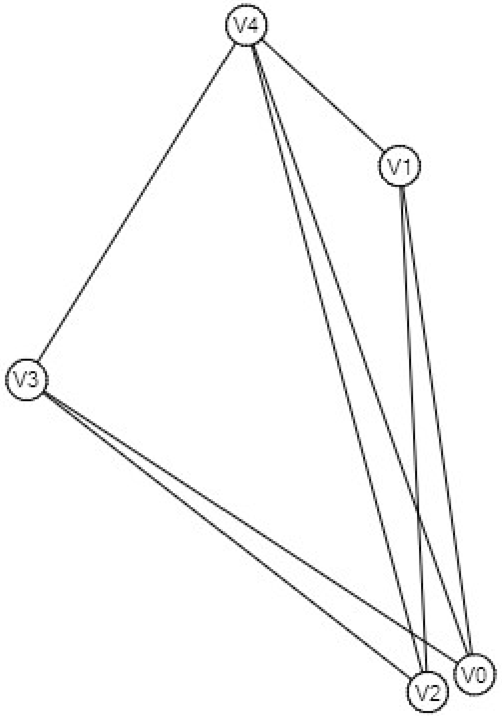
Example of 3-Connected Graph



Adjacency Matrix	Degree Matrix
0,1,0,1,1	3,0,0,0,0
1,0,1,0,1	0,3,0,0,0
0,1,0,1,1	0,0,3,0,0
1,0,1,0,1	0,0,0,3,0
1,1,1,1,0	0,0,0,0,3

Tutte’s Embedding

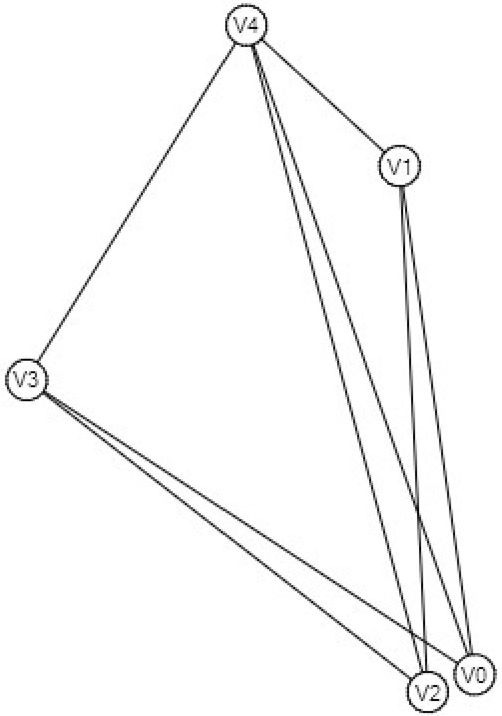
Consider vertices have 1 unit weight
and Edges are spring Connecting them



Adjacency Matrix	Degree Matrix
0,1,0,1,1	3,0,0,0,0
1,0,1,0,1	0,3,0,0,0
0,1,0,1,1	0,0,3,0,0
1,0,1,0,1	0,0,0,3,0
1,1,1,1,0	0,0,0,0,3

Peripheral Face

- The face which encloses all the vertices



In this graph, any face could be peripheral face

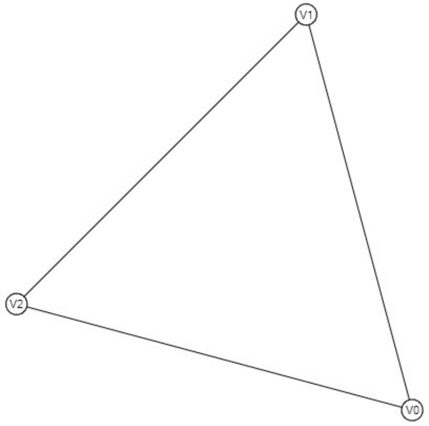
Adjacency Matrix

0,1,0,1,1
1,0,1,0,1
0,1,0,1,1
1,0,1,0,1
1,1,1,1,0

Degree Matrix

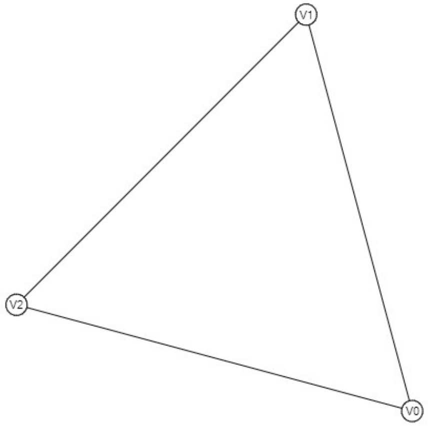
3,0,0,0,0
0,3,0,0,0
0,0,3,0,0
0,0,0,3,0
0,0,0,0,3

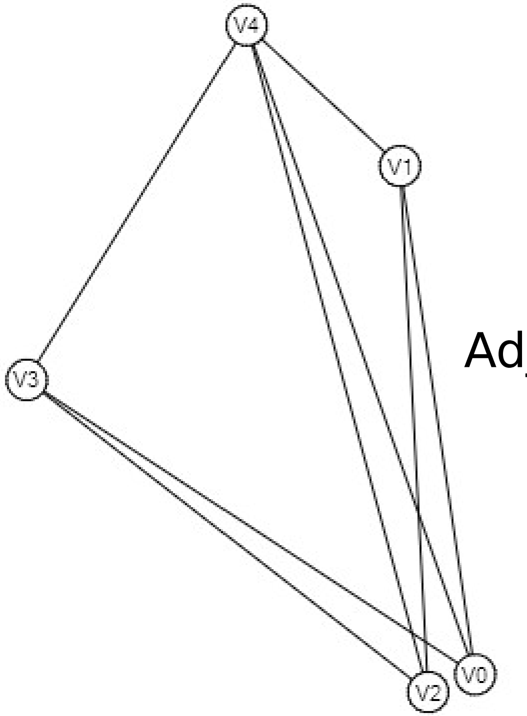
Consider this to be Peripheral Face



Springs Pulling the Weight

Consider this to be Peripheral Face and Has fixed Co-ordinates





Adjacency Matrix	Degree Matrix	Laplacian Matrix	Co-ordinates
0,1,0,1,1	3,0,0,0,0	3,-1, 0,-1,-1	a1,b1
1,0,1,0,1	0,3,0,0,0	-1, 3,-1, 0,-1	a2,b2
0,1,0,1,1	0,0,3,0,0	0,-1, 3,-1,-1	a3,b3
1,0,1,0,1	0,0,0,3,0	-1, 0,-1, 3,-1	x1,y1
1,1,1,1,0	0,0,0,0,3	-1,-1,-1,-1, 3	x2,y2

By Solving the Laplacian Matrix we can find the co-ordinates of other points

Final Product