

CSI701 - Adam Cadien  
Assignment #2  
10/7/09

#### #Data Generation

The main() function can be found in gradfield.cpp. Data is read in and triangles are created in a similar manner to assignment #1. The vector type of data structure was used to create and hold the RHS information and mass matrix. A running sum of the area contribution and grad(N) at each point of an element is used to find the R vector. At the same time the lumped mass matrix (M) is generated and summed over each of these points. All that's left is to divide the RHS by M to solve for the vector field. Results are written to STDOUT and typically piped to a file:

```
./gradfield > vec_field.dat
```

#### #Results & Plotting

Contour plots can be found in vec\_fld\_contour and scl\_fld\_contour PDF files. I have superimposed an artificial circular gap centered at (0,0) with radius 0.3 to approximate the missing mesh points in this region, those plots have the \_gap suffix. These were created using the \*.dat files which are modified pts and fld files which have the first line removed. The matlab script plot\_vec\_fields.m will create these plots or can be slightly altered to generate them (remove/addition of comments). The 'meshgrid' command was used to create a uniform grid of interpolation points and the interpolation is performed using the 'griddata' command. This data is then used to create the contour plots.