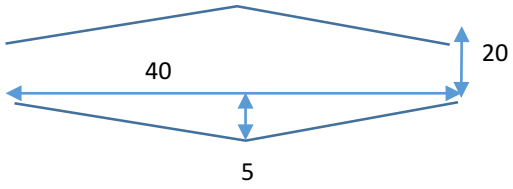
Physics PH256 – HW Assignment 8 (due 10/27/2017)

1. Progress report on the semester project. If you have not started to write a program for your semester project, you need to start now. Please show some initial code that you will use to study your particular topic. This doesn't need to be advanced, but it needs to show a 'proof of principle' idea. If you can create some visualizations that show that your code is producing some physically meaningful results.
2. Modify your code that computes the electrostatic potential in 3-dimensions for two parallel plates that have a crease in the middle such as



Make the center of the center of each plate deviate from the edges 5 grid points. Use a grid size of 80x80x80, length of the plates of 40 (from edge to edge), separation of the edge of one plate to the other be 20. Compute 1000 iterations for good convergence.

a) Compute the electrostatic potential for this configuration and create 2D plots of different sections using pcolormesh.
b) Calculate the electric field and plot it on the 2D sections using matplotlib quiver.
c) Use the code block generated in class to save the electrostatic potential to a netcdf file and load into ParaView. Use the contour filter (Filters > Alphabetical > Contour) to create 10 isosurfaces based on the potential. Use the clip filter (Filters > Alphabetical > Clip) to show a slice of the 3D potential and the isosurfaces. Use File>Save Screenshot to create an image of this.

Extra work for graduate students

d) Save the electric field of the system to a netcdf file and also load into ParaView. Use the Calculator filter to create a vector field from the individual components (Ex*iHat + Ey*jHat + Ez*kHat). Create a single isosurface of the potential with the Contour filter, and use the Resample with Dataset filter to select only the values of the electric field that correspond to that surface. Use the glyph filter to plot the vectors from the Calculator filter.