Computational Fluid Dynamics

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1 Introduction

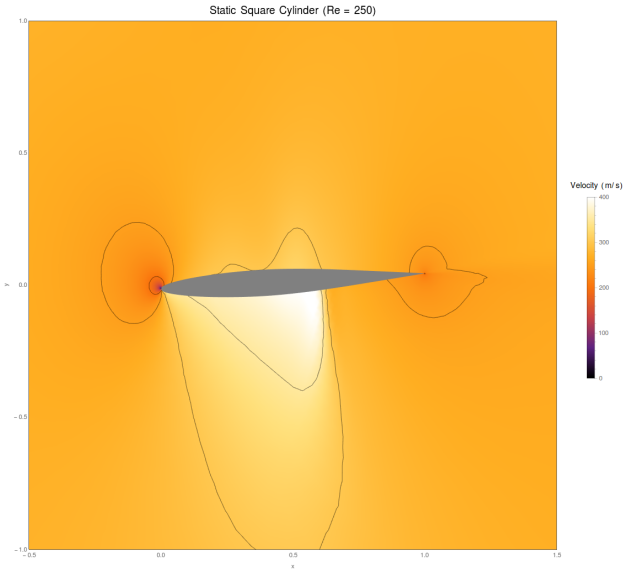

Figure 1: Look at how neat that is!

2 Theory

Figure 1 is neat.

3 SU2

3.1 Mesh

4 Code

```
(*Change the current directory to where the files are*)
SetDirectory['/home/brady/SU2/CFD/Results/Square_Cylinder'];

(*Set the plot limits*)
xmin = -2;
xmax = 6;
```

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ymin = -2;
ymax = 2;
zmax = 20;

(*Set the colour function as well as the legend style*)
colfunc = ColorData['SunsetColors'][#/zmax]&;
leg = BarLegend[{colfunc,{0,zmax}},LegendLabel->'Velocity (m/s)',
    LegendMarkerSize -> 500];

(*Draw a gray ploygon using the points of the surface_flow.csv*)
shape = Graphics[{Gray,Polygon[Import['surface_flow_00500.csv'
    ][[2;;-1,{2,3}]]]}];

(*Clean the data so it's in a usable form*)
(*Import the data file, and remove the preamble (three lines)*)
datafile = Import['flow_00500.dat'][[4;;-1]];
(*There is four seemingly random numbers per line for several lines at the end
    , this ignores those lines*)
Do[If[Dimensions[datafile[[i]]][[1]]==4,{CleanData=datafile[[1;;i-1]],Break
    []}],{i,1,Dimensions[datafile][[1]]}];
(*Only the first 5 columns are needed*)
(*x, y, \[Rho], \[Rho]u, \[Rho]v*)
Data = CleanData[[All,1;;5]];

(*Declare and fill arrays for the velocity, and streamlines*)
stream = {};
velocity = {};
Do[{If[Data[[i,1]]>xmin && Data[[i,1]]<xmax && Data[[i,2]]>ymin && Data[[i
    ,2]]<ymax,AppendTo[stream,{{Data[[i,1]],Data[[i,2]]},{Data[[i,4]]/Data[[i
    ,3]],Data[[i,5]]/Data[[i,3]]}}]];
AppendTo[velocity,{Data[[i,1]],Data[[i,2]],Sqrt[(Data[[i,4]]/Data[[i,3]])^2+(
    Data[[i,5]]/Data[[i,3]])^2]}]},{i,1,Length[Data]}]

velplot = ListDensityPlot[velocity,ColorFunction->colfunc,PlotRange->{{xmin,
    xmax},{ymin,ymax},{0,zmax}},AspectRatio->Automatic,PlotLegends->leg,
    ColorFunctionScaling->False,FrameLabel->{'x','y'},PlotLabel->Style['Square
    Cylinder (Re = 250)',FontSize->18,Black],ImageSize->Full];

VelocityFull = Show[velplot, shape]
```

Listing 1: This is my caption.