# Viscous Flow over Cylinder

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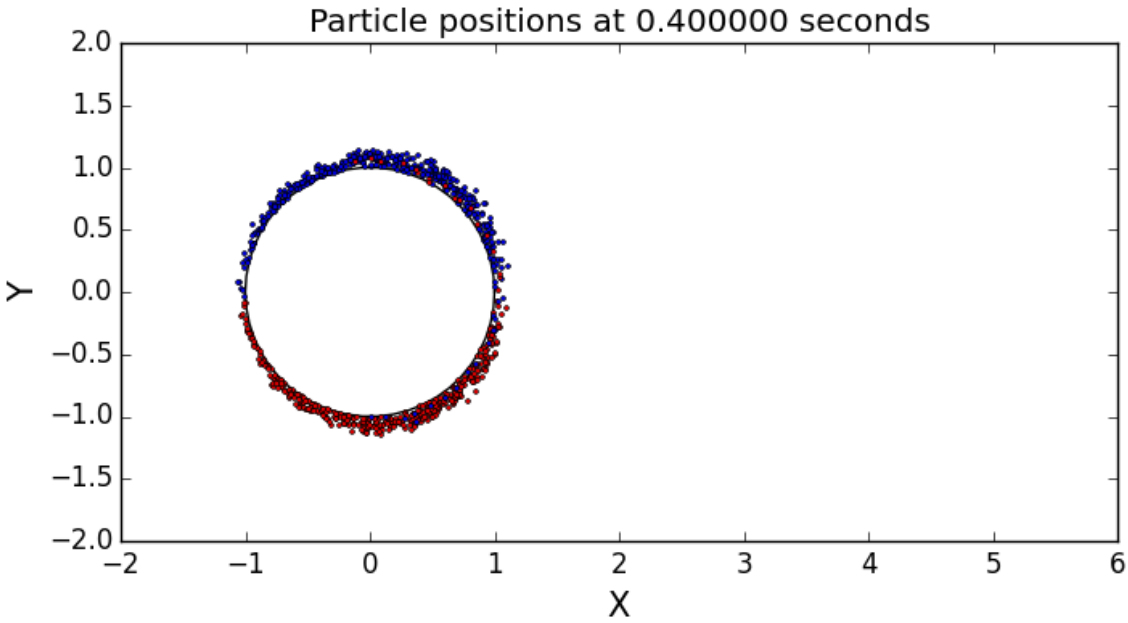
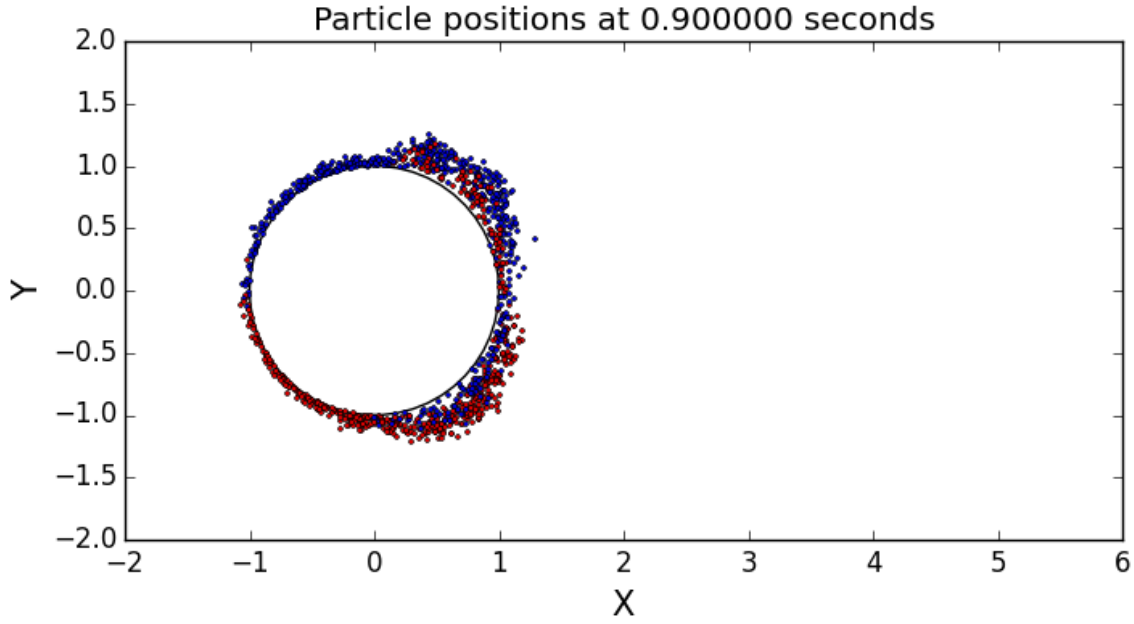
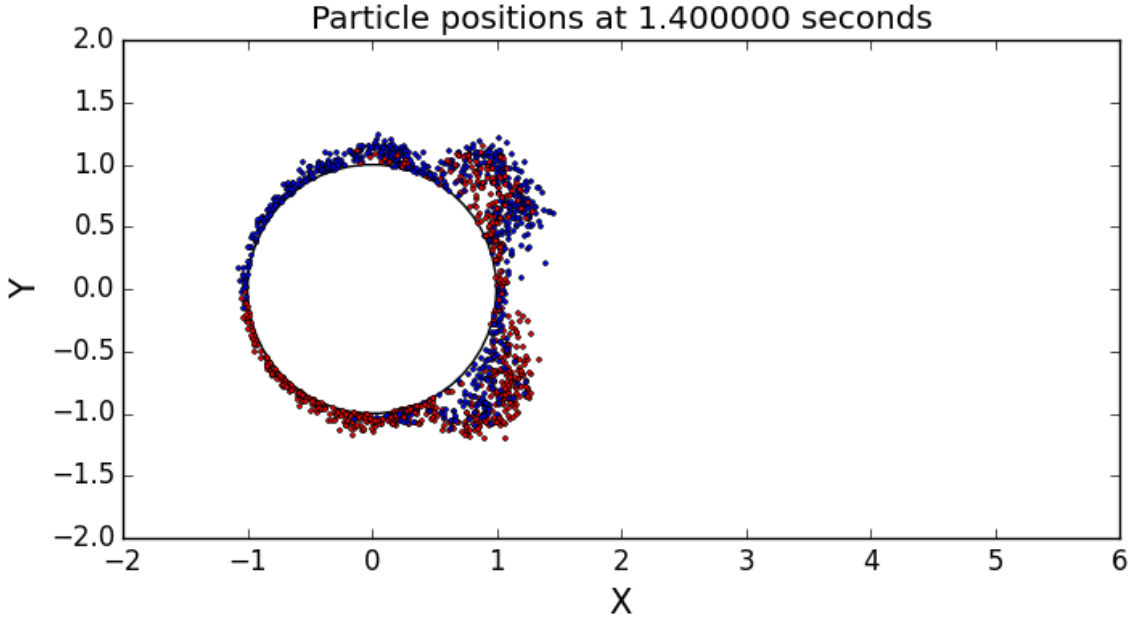
## Parameters:

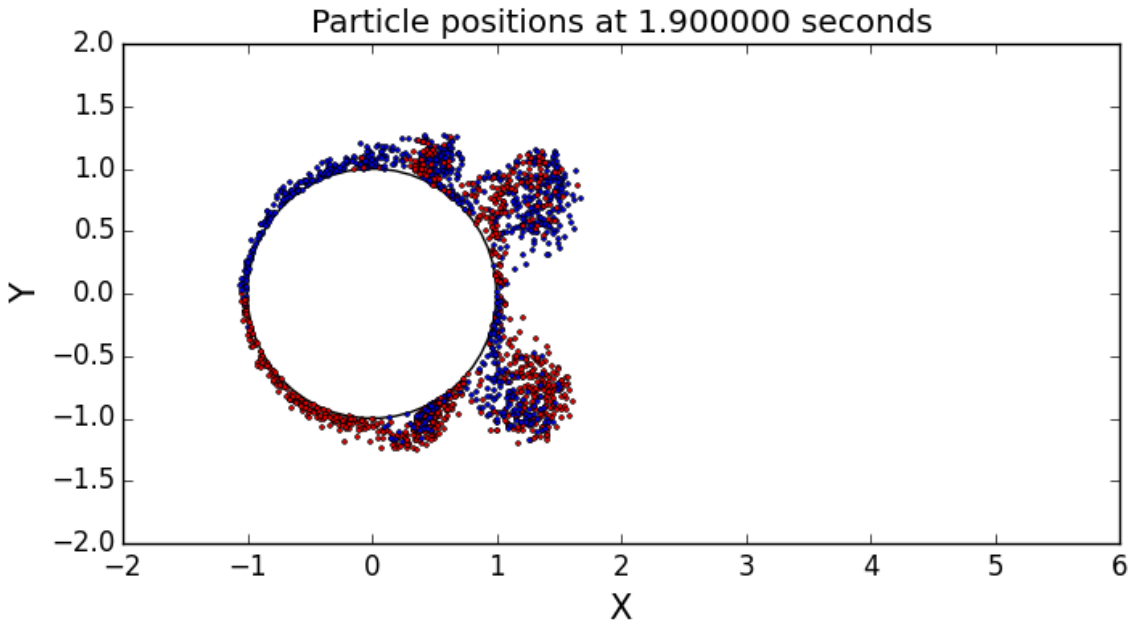
- Number of Panels: 50 (Linear)
- time step = 0.1 s
- gamma_max = 0.1 (of released panels)
- Re = 1000
- freestream = 1
- particle reflection from radius+(1e-6)
- Slip calculation at [norm(cp) + 1e-6] and blob placed at blob radius away from point of slip calculation

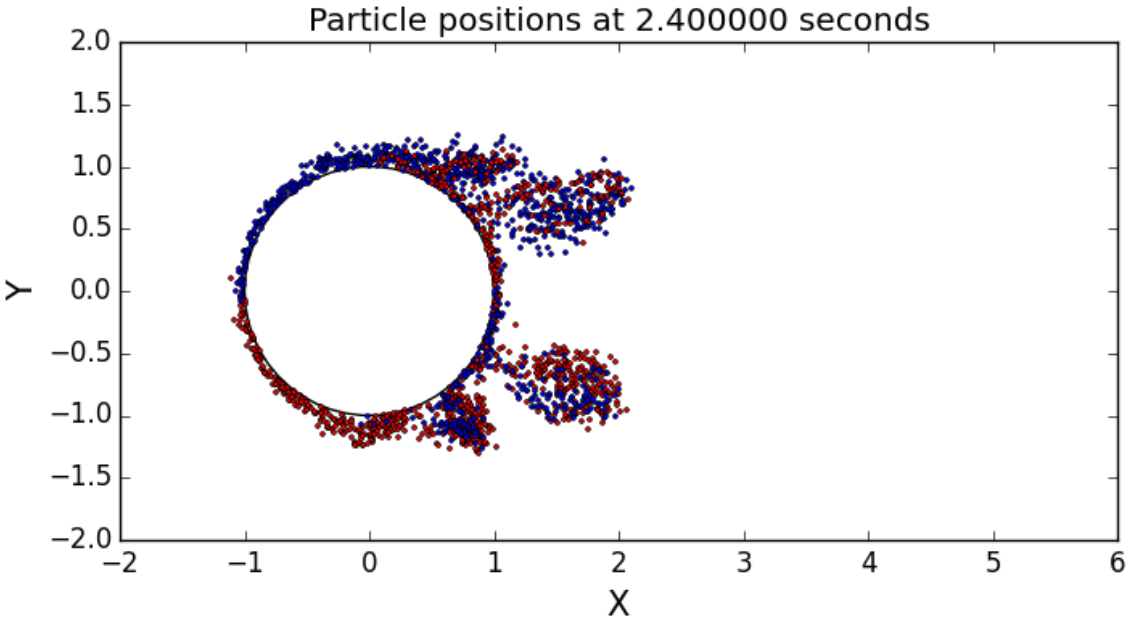
## 1) Particle plot at t= [0.4, 0.9, 1.4, 1.9, 2.4, 2.9] s

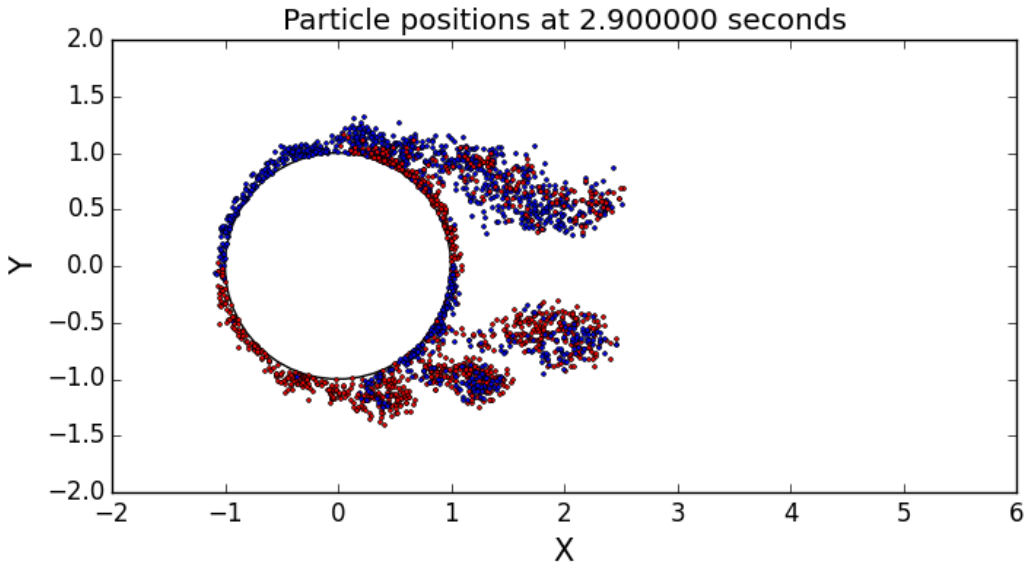



Particle positions at 0.900000 seconds
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
Y
−2
−1
0
1
2
3
4
5
6
X

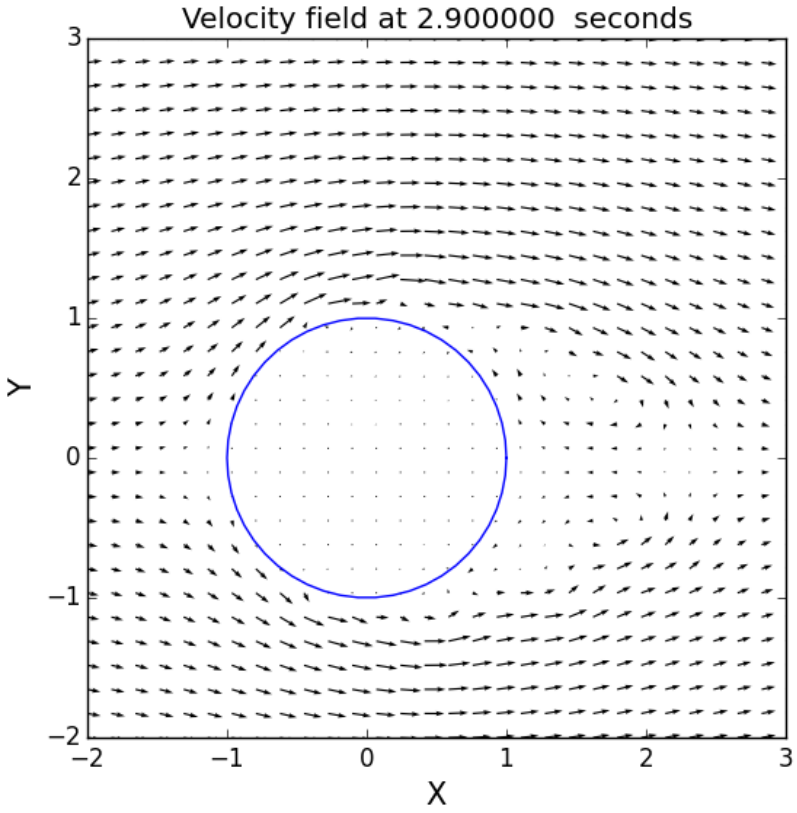

Particle positions at 1.400000 seconds
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
Y
−2
−1
0
1
2
3
4
5
6
X


Particle positions at 1.900000 seconds
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
Y
−2
−1
0
1
2
3
4
5
6
X

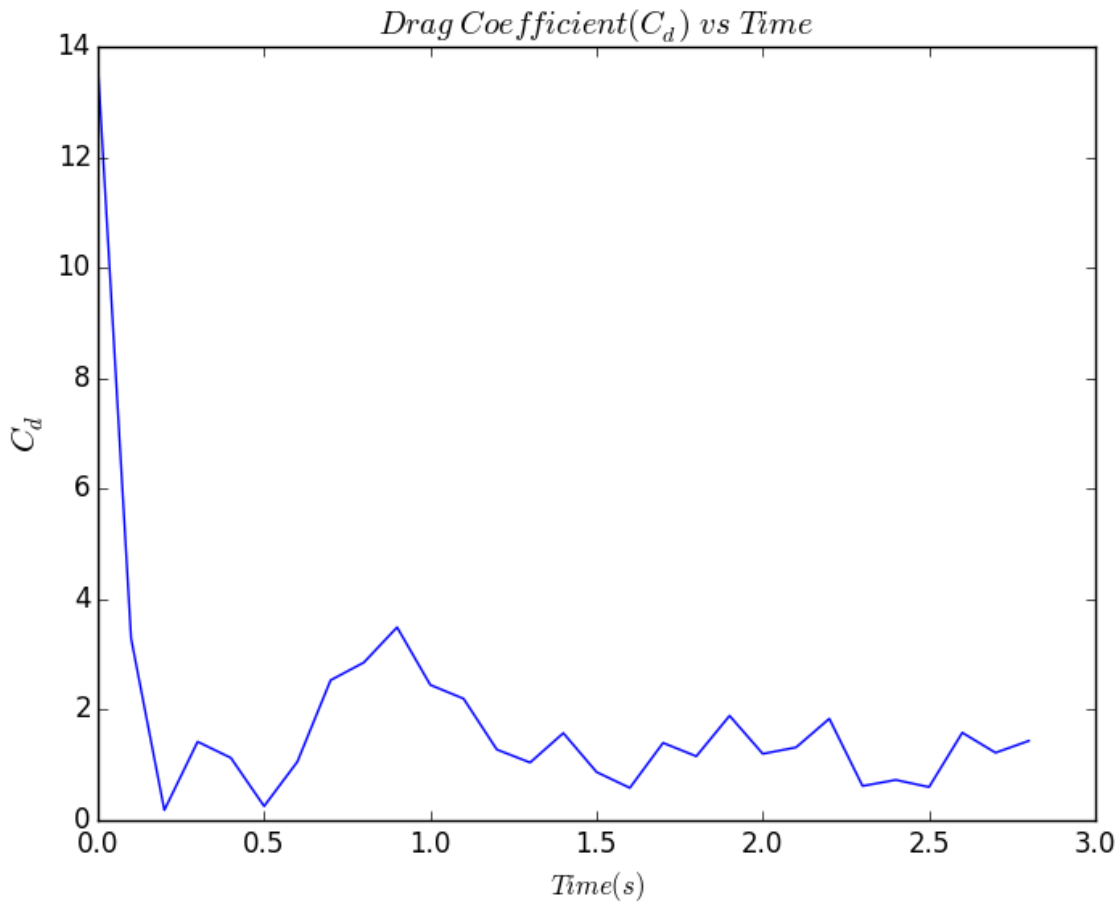

Particle positions at 2.400000 seconds
2.0
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
Y
−2
−1
0
1
2
3
4
5
6
X




## 2) Velocity field at t = 2.9 s



## 3) Drag Coefficient plot




## Conclusions:

- For the given Reynolds number (from ~47=1e5), vortex shedding is expected to happen and it is reflected in the plots presented
- From the velocity field plot we can clearly see the formation of vortices in the wake of the cylinder
- The slip at the panels is not nullified exactly because we have made a very crude approximation of not considering the other image vortices for considering slip calculation. This can be made better by solving a linear system by taking the effect of all the vortex blobs placed just above the panel
- The slip velocity is calculated just above the control point because the velocity calculations are inaccurate at the control point
- For Re=1000, the drag coefficient is supposed to be less than 2, which it is.
- Since the flow is impulsively started, the drag coefficient is very high in the beginning and begins to converge as time progresses.
- negative blobs are coloured blue and positive red
- the flow layer is getting thickened over the cylinder downstream