All the tasks are done without any collaboration

Task 1

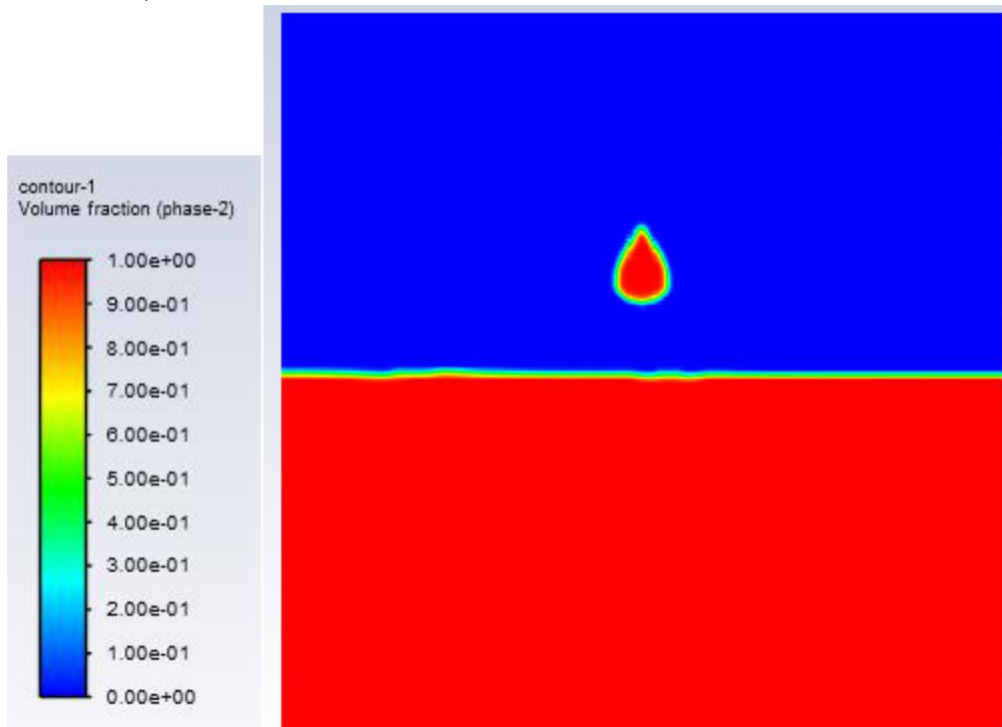Mesh size 0.003
Time step size 0.0005
Number of time steps 1000

Figure 1: volume fraction of water at t = 0.15 sec
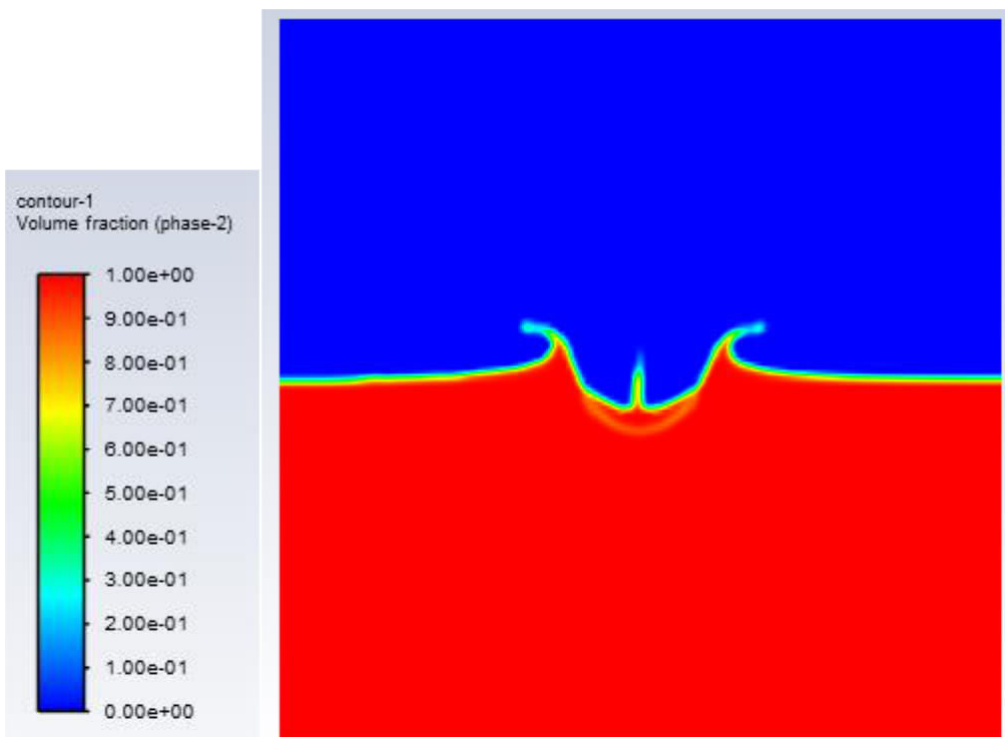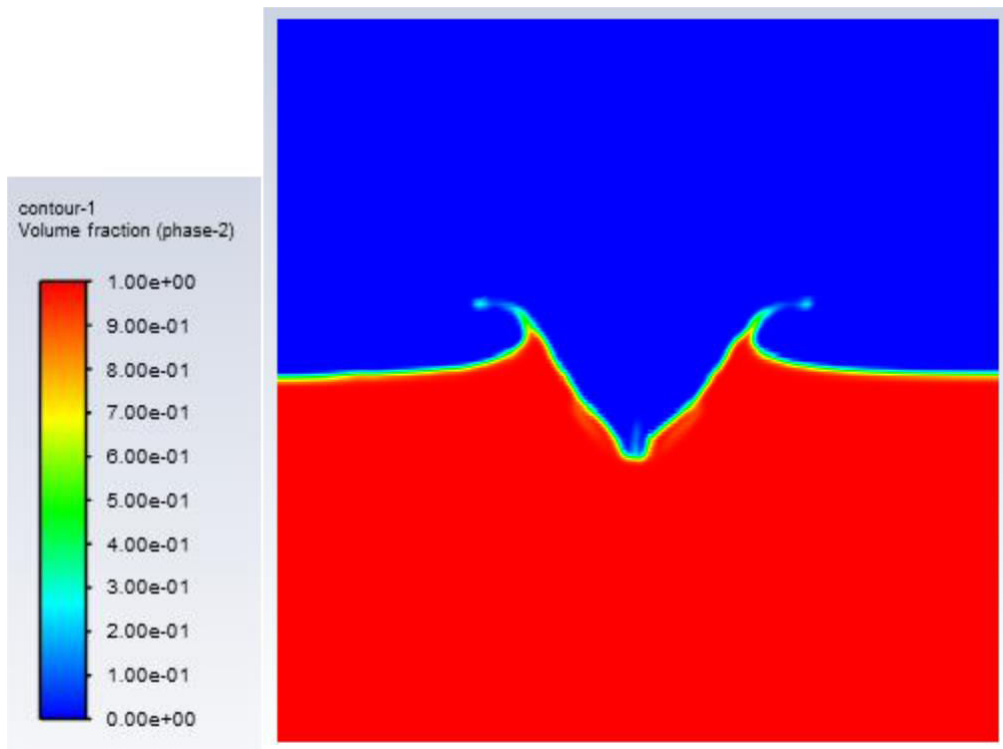

Figure 2: volume fraction of water at t = 0.25 sec

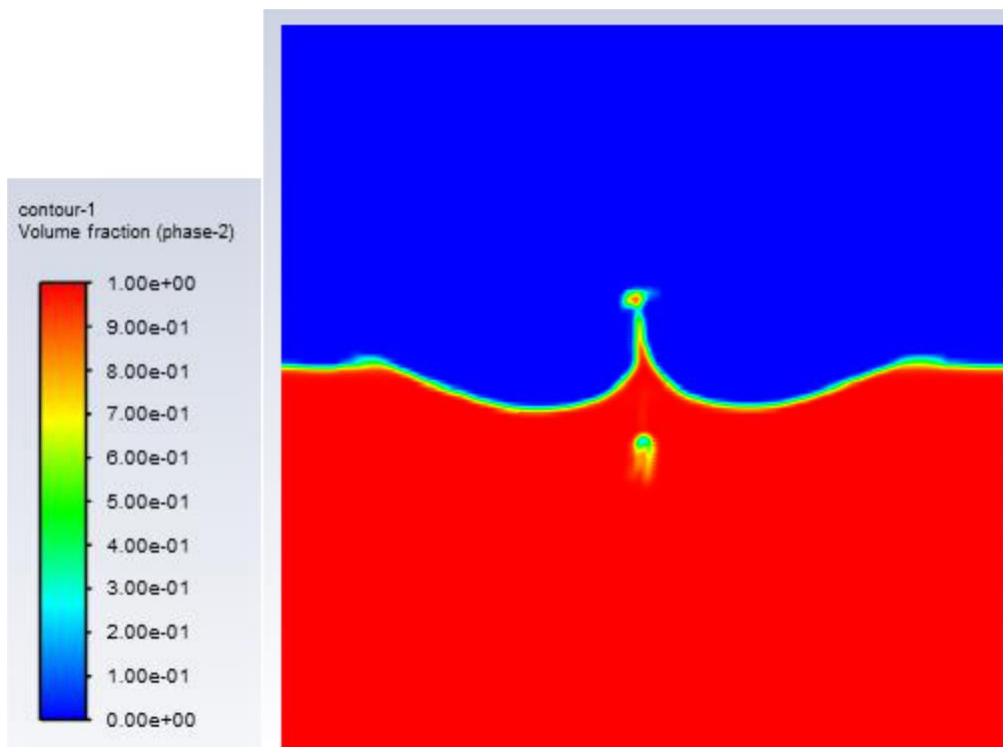Figure 3: volume fraction of water at t = 0.3 sec

Figure 4: volume fraction of water at t = 0.5 sec

Task 2 (a)

Mesh size 0.004m, At refined region 0.002m
Time step size 0.001
Number of time steps 100

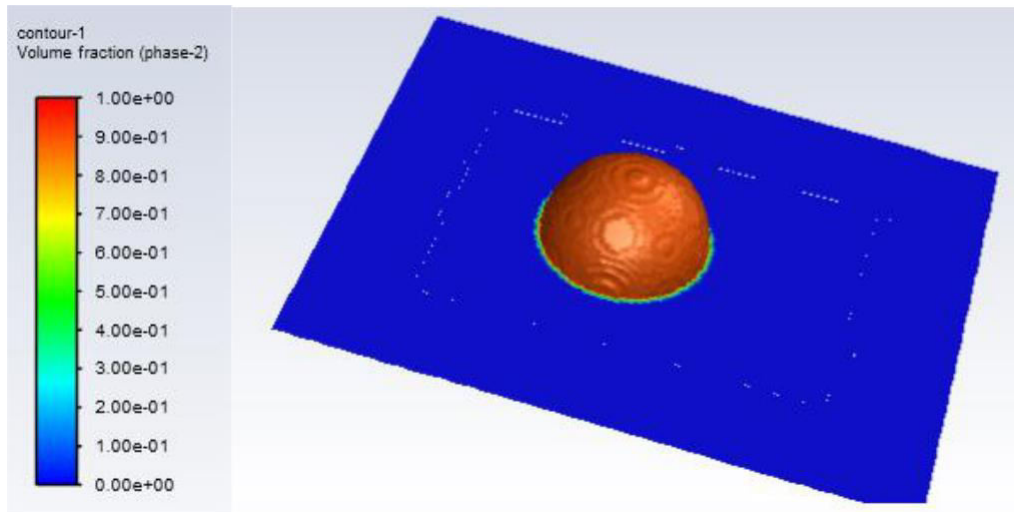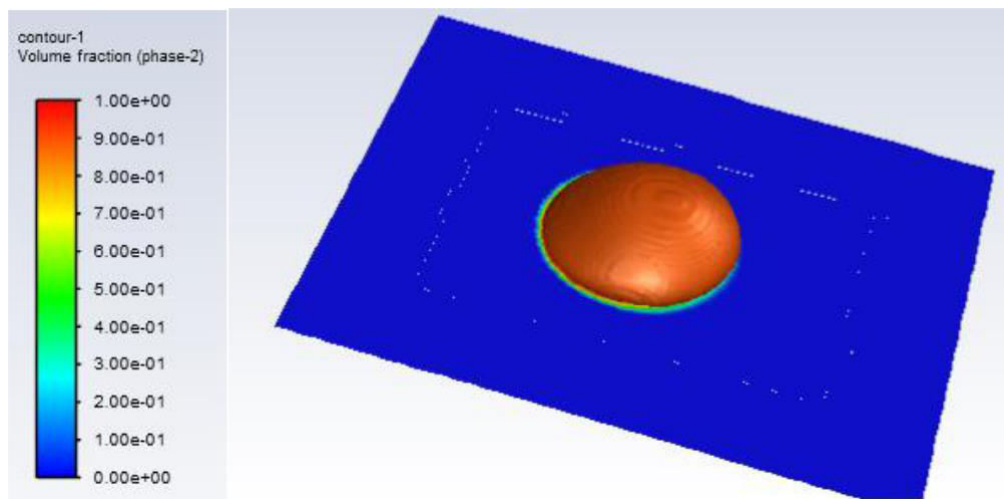Figure 5: volume fraction of glycerine at t = 0 sec
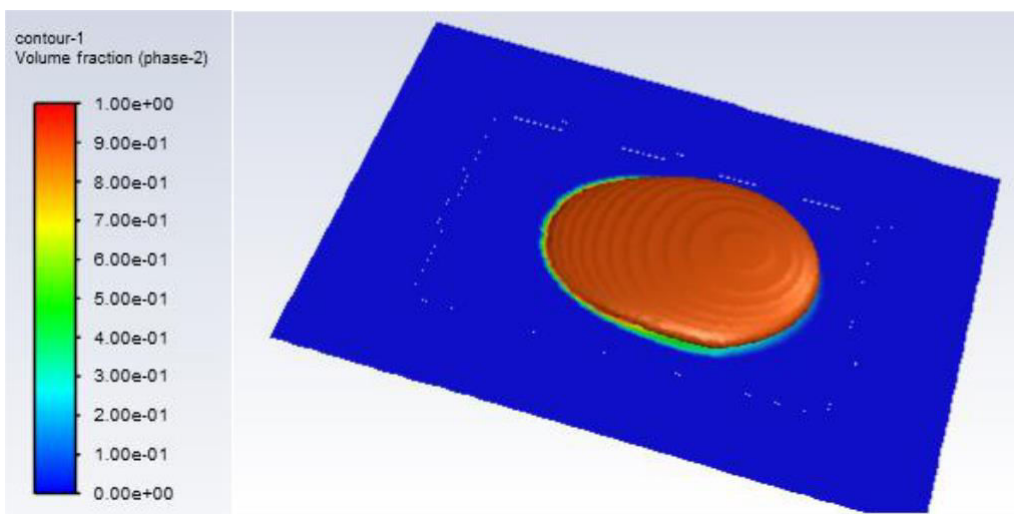

Figure 5: volume fraction of glycerine at t = 0.05 sec

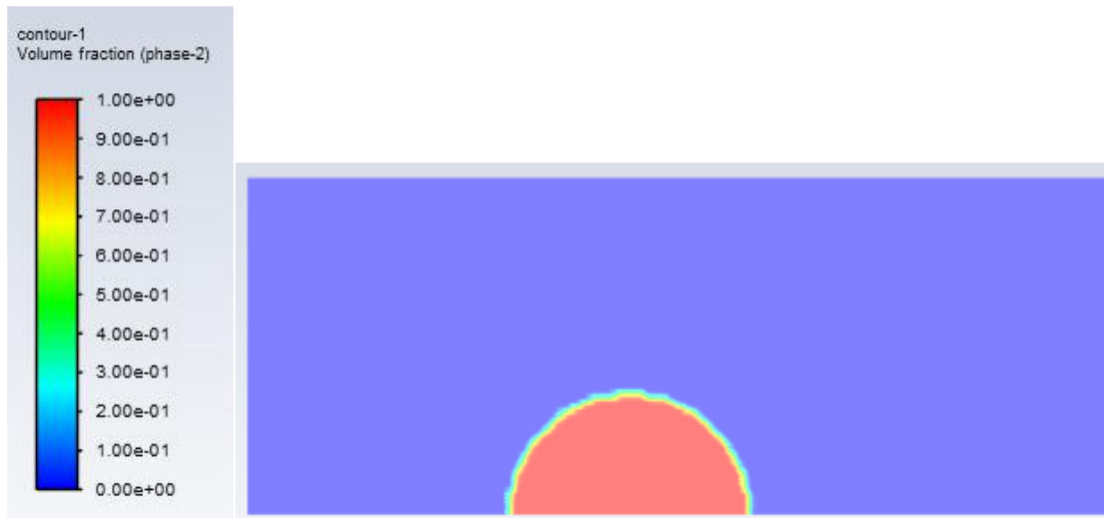Figure 7: volume fraction of glycerine at t = 0.1 sec

Task 2 (b)

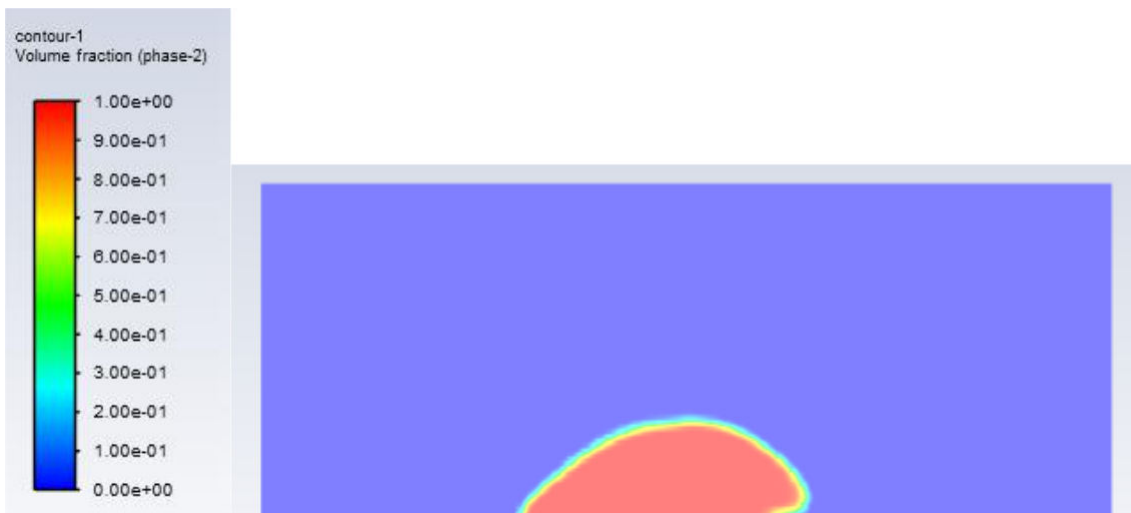

Figure 8: volume fraction of glycerine at t = 0 sec

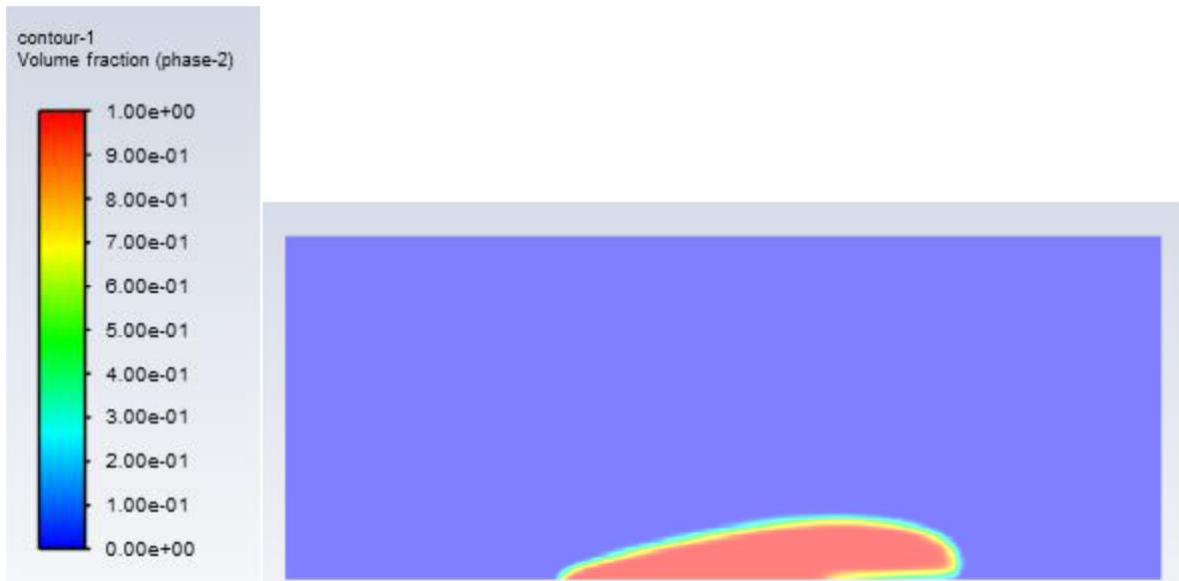Figure 9: volume fraction of glycerine at t = 0.05 sec

Figure 10: volume fraction of glycerine at t = 0.1 sec

Task 3(a)

Mesh size 0.5m
Time step size 0.1 (big time step is used as the mesh is coarse)
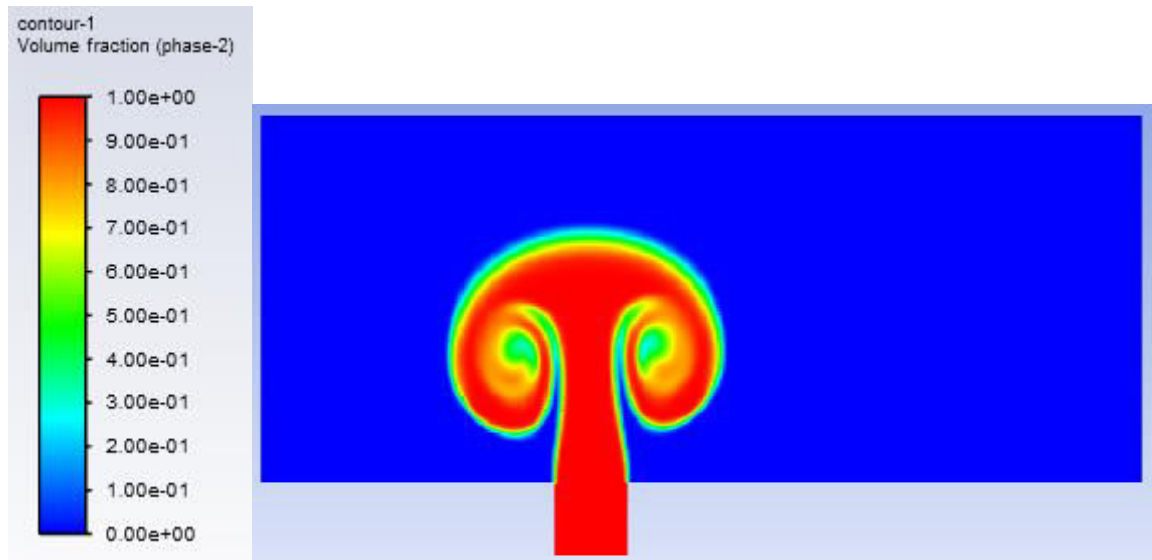Number of time steps 100

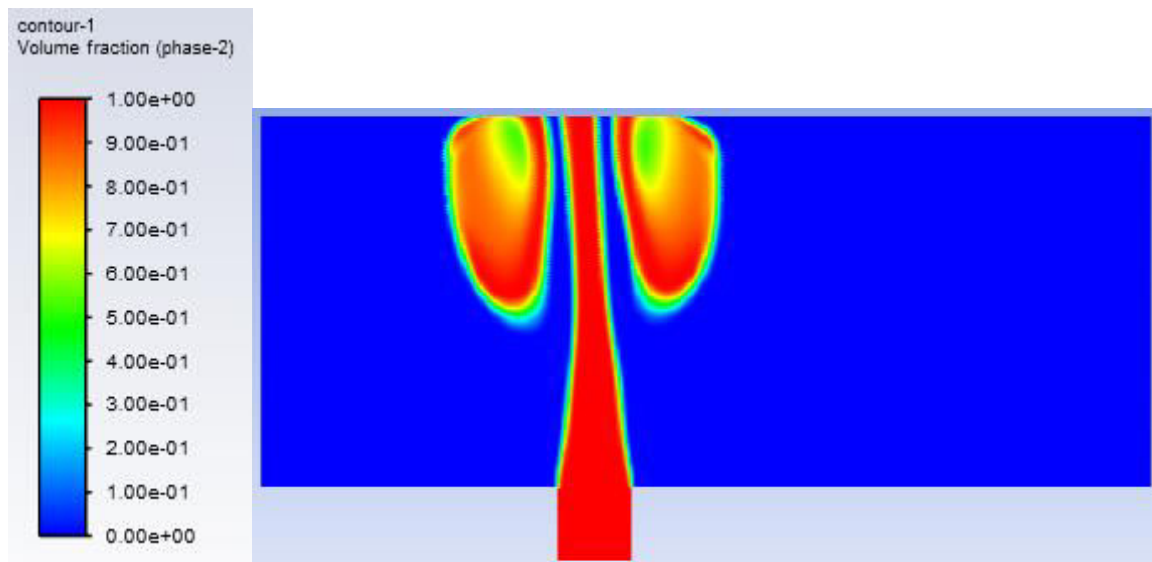Figure 11: Contour plots of the volume fraction of methane at t = 7 sec

Figure 12: Contour plots of the volume fraction of methane at t = 10 sec

Task3(b)

Mesh size 0.5m
Time step size 0.1 (big time step is used as the mesh is coarse)
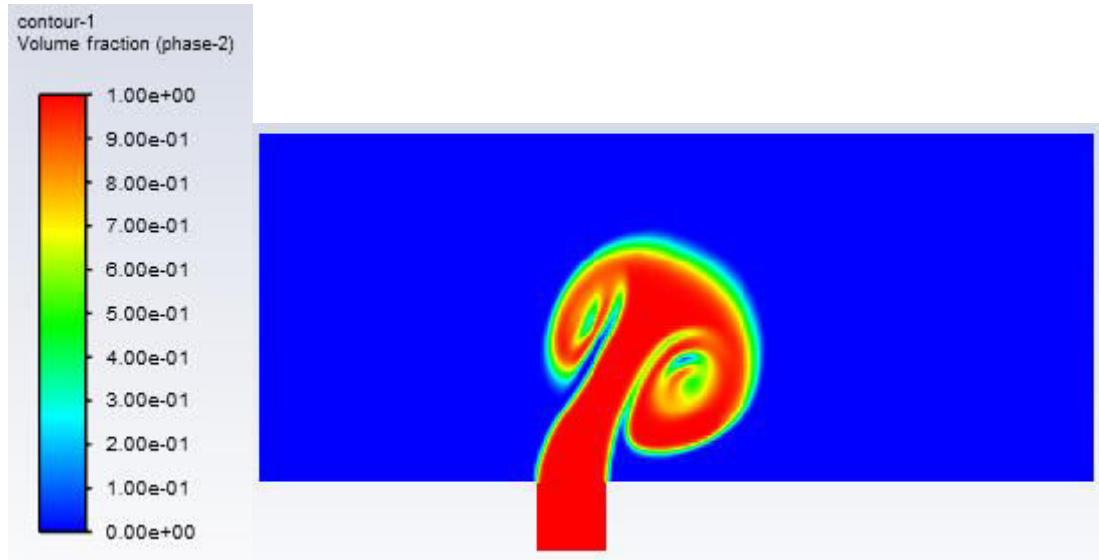Number of time steps 120

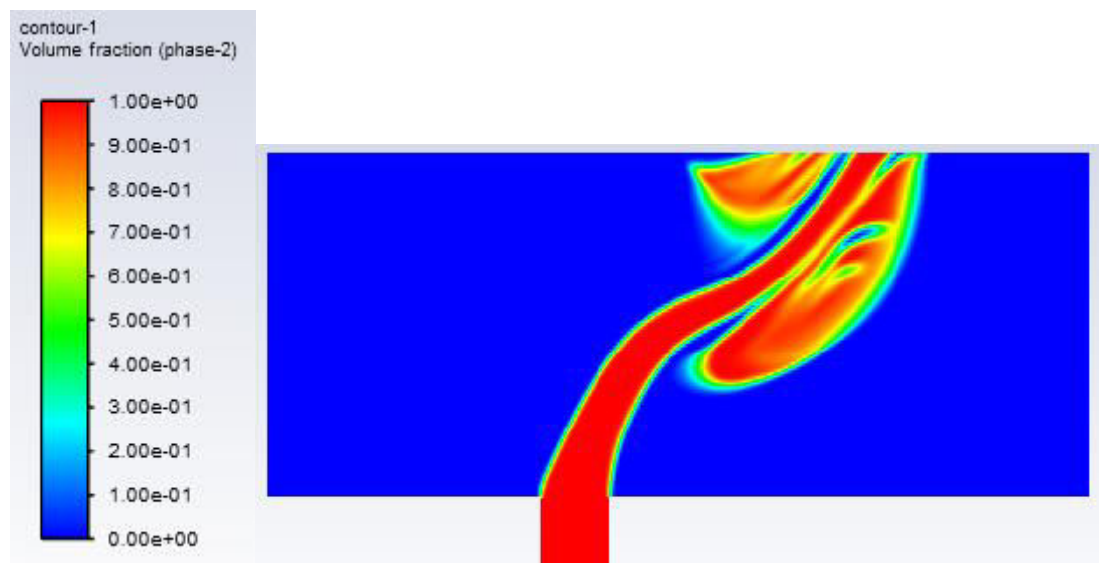Figure 13: Contour plots of the volume fraction of methane at t = 9 sec

Figure 14: Contour plots of the volume fraction of methane at t = 12 sec

Task 4

Mesh size 0.002m
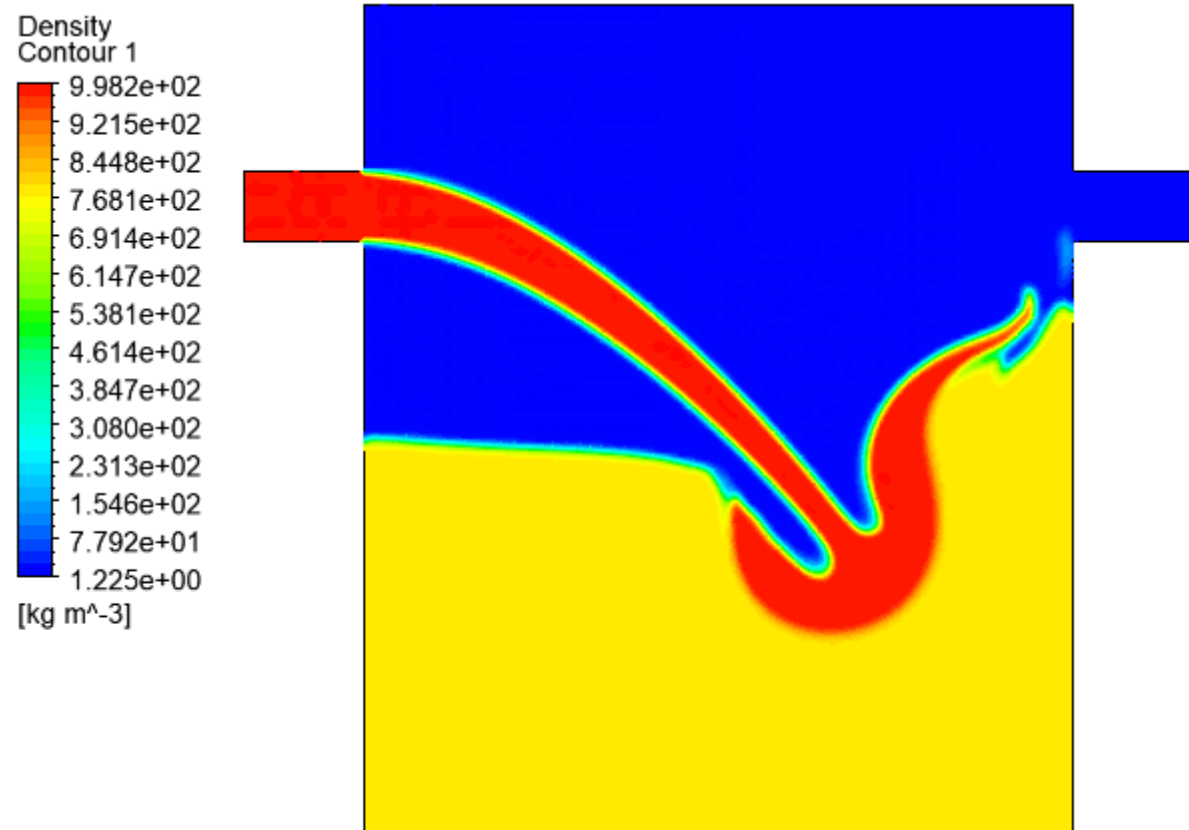Time step size 0.002
Number of time steps 200

Figure 15: Contour plots of the density of the mixture at t = 0.4 sec