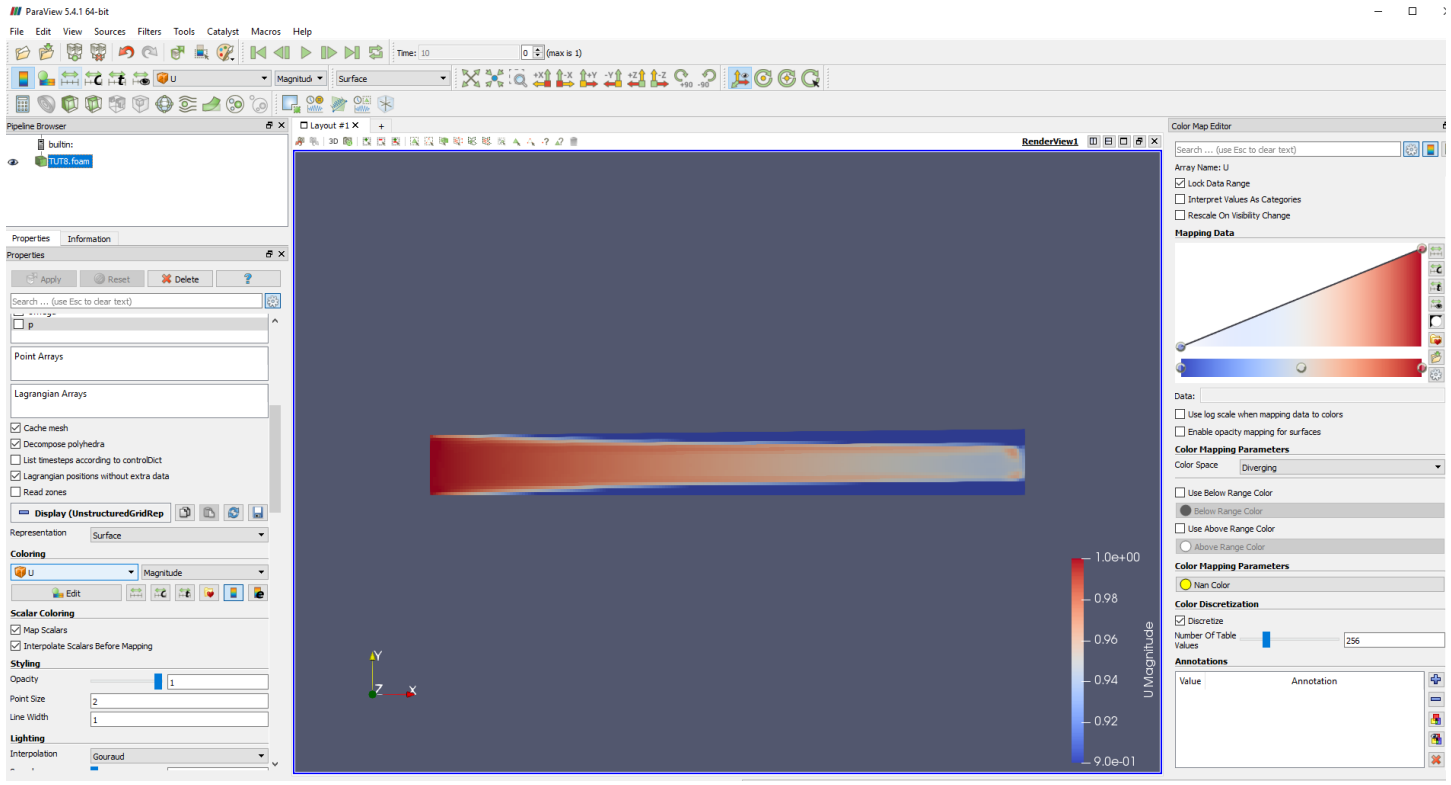# Assignment 5

Task 9-
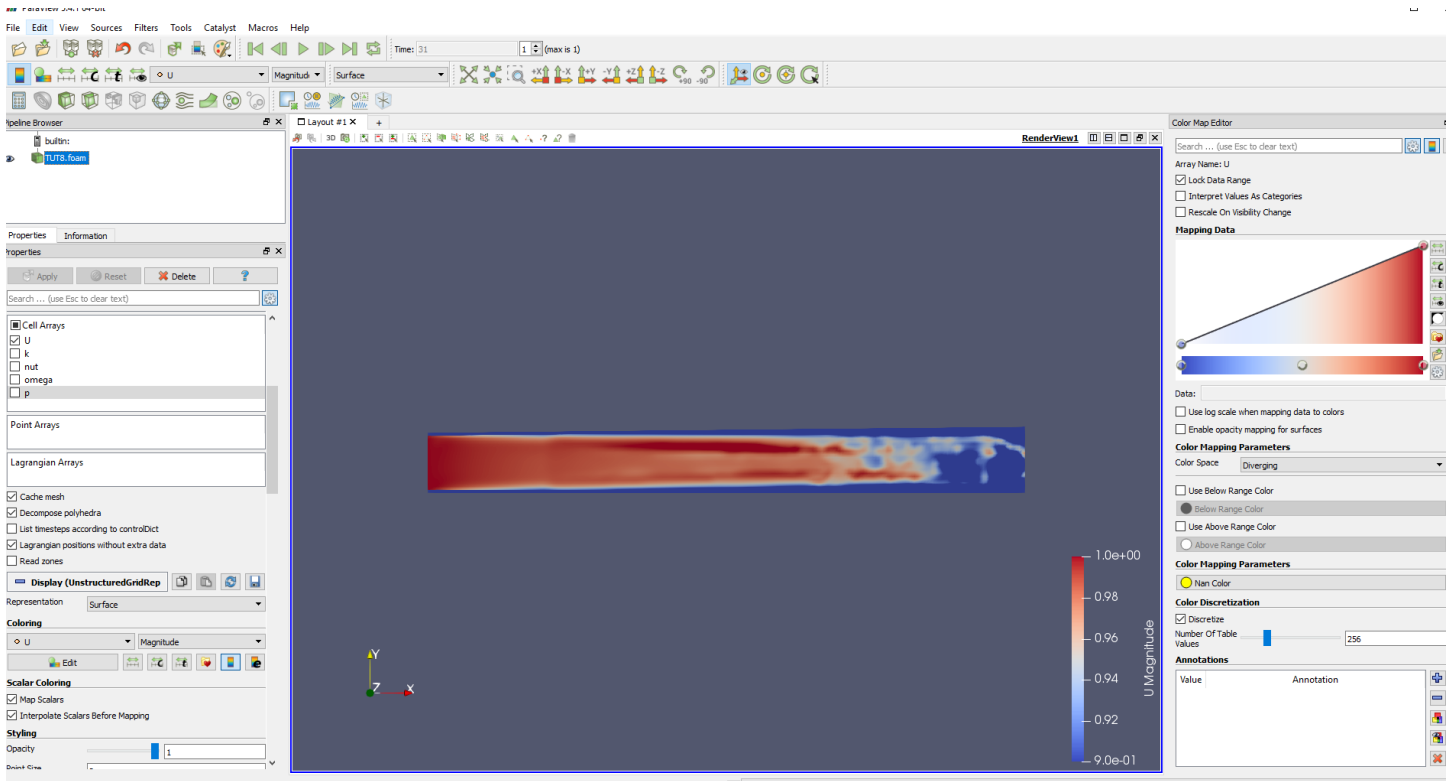

Figure 1 - After 10 iterations
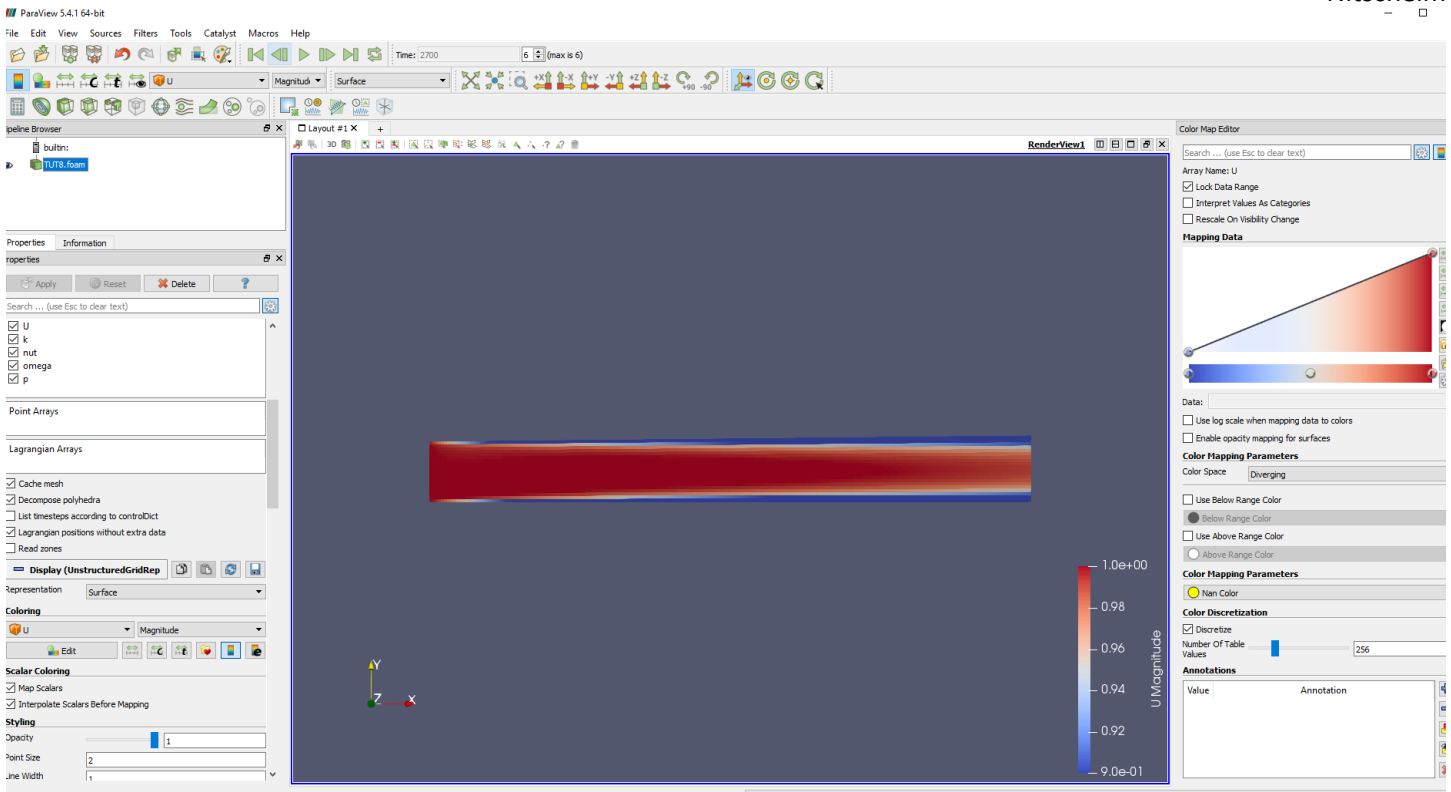

Figure 2 - After 0.1 Convergence

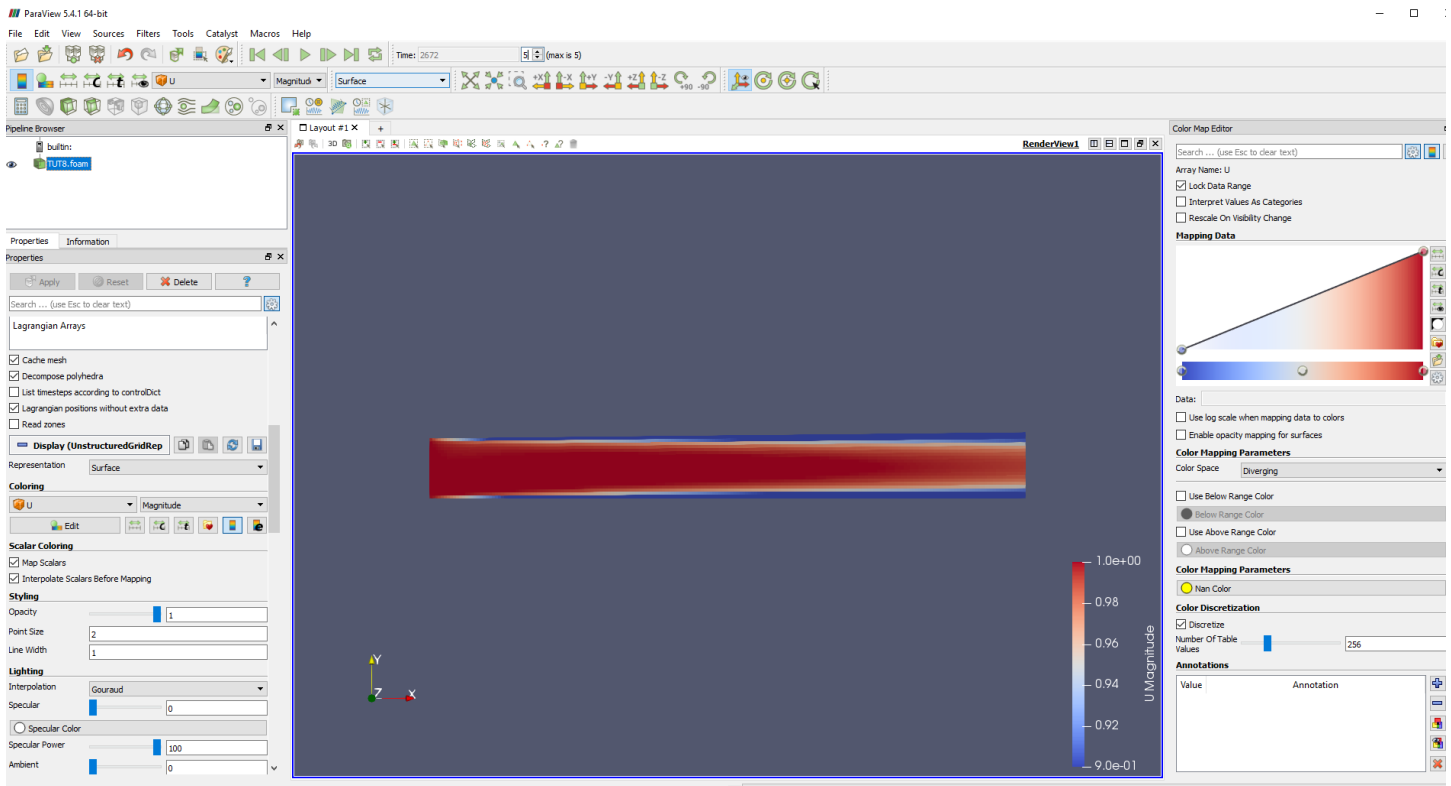Figure 3 - After 0.001 Convergence

Figure 4 - After fvSolution Convergence
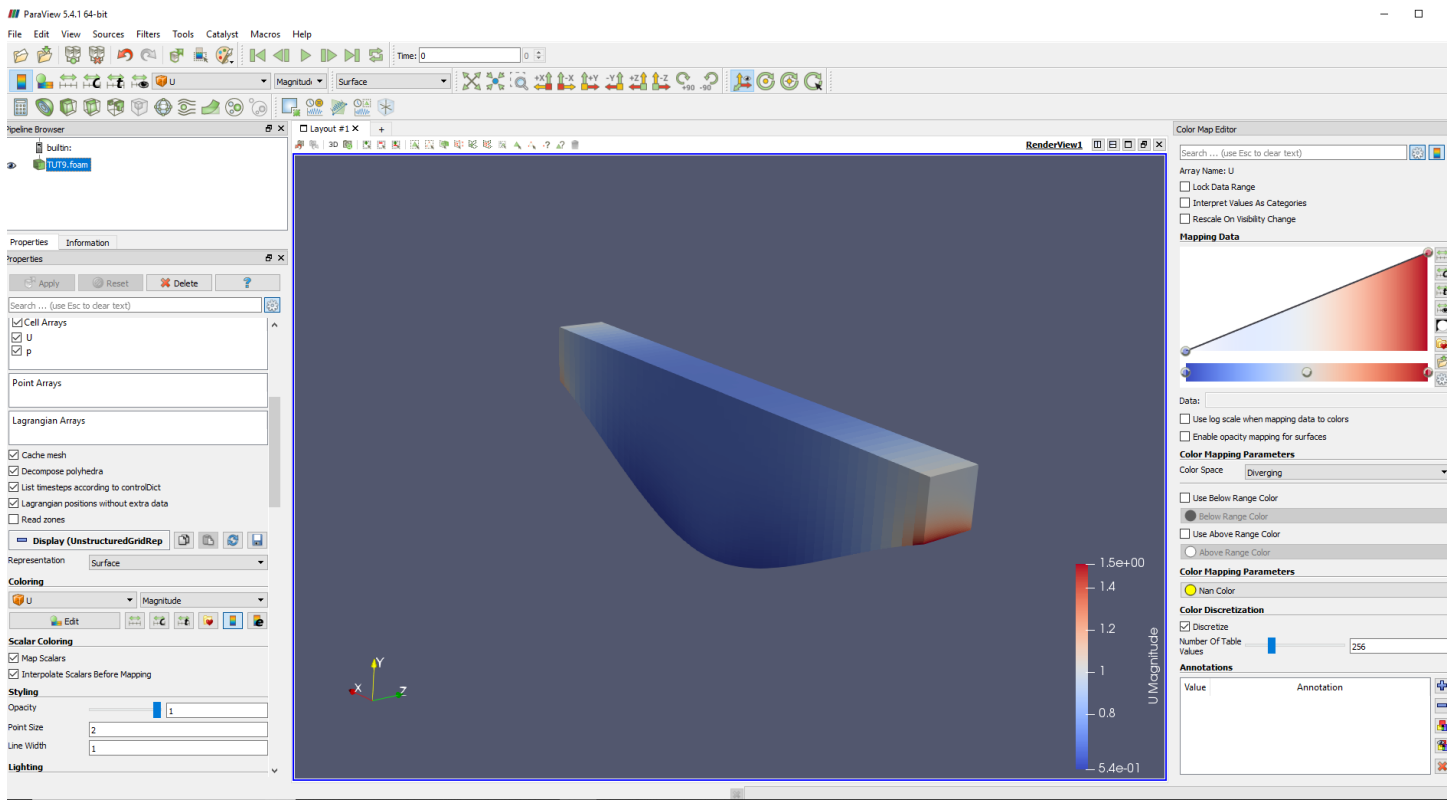
Task 10-
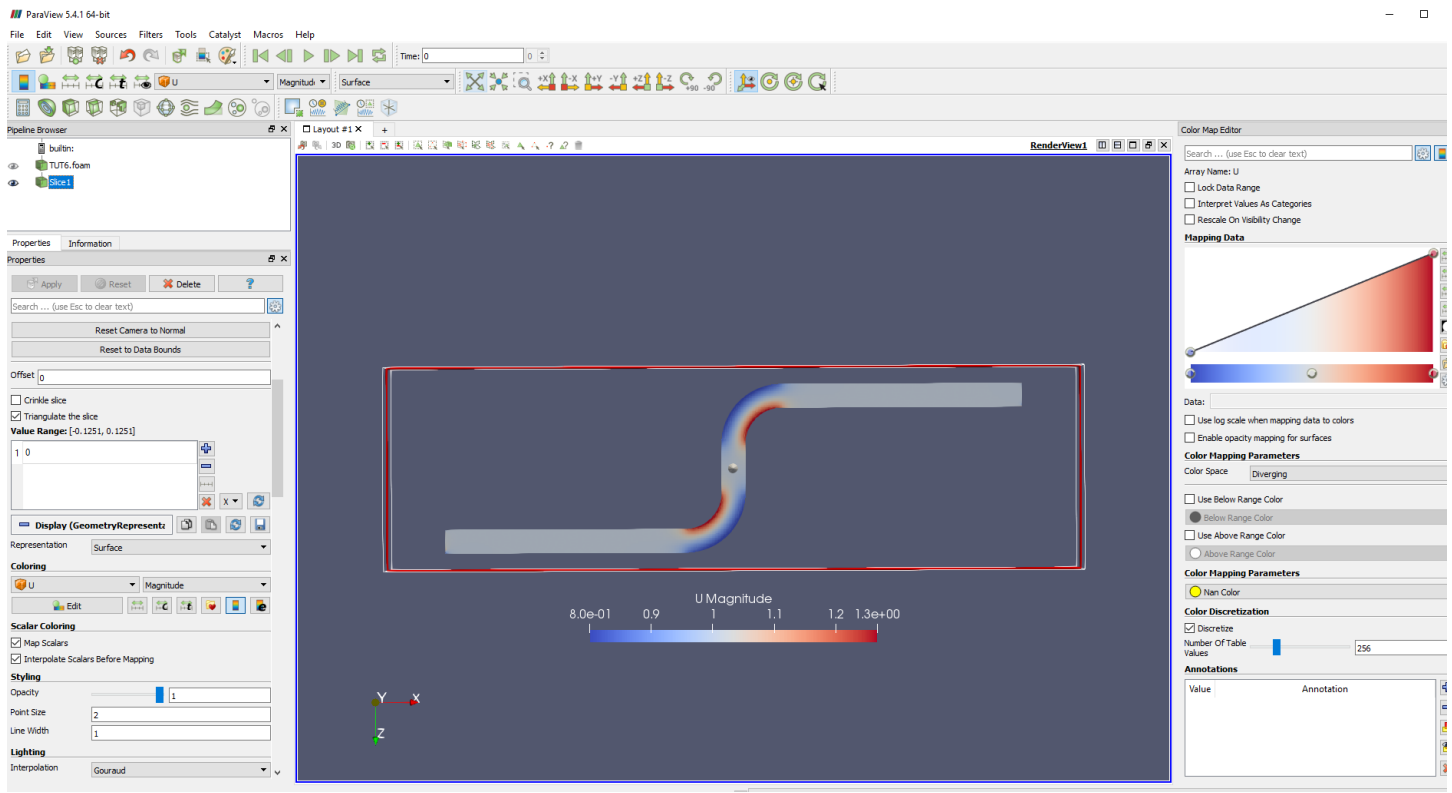

Figure 5 - 3D Velocity Profile with Spline

Task 11-

Figure 6 - Velocity Profile of the Pipe showing Corner Velocities
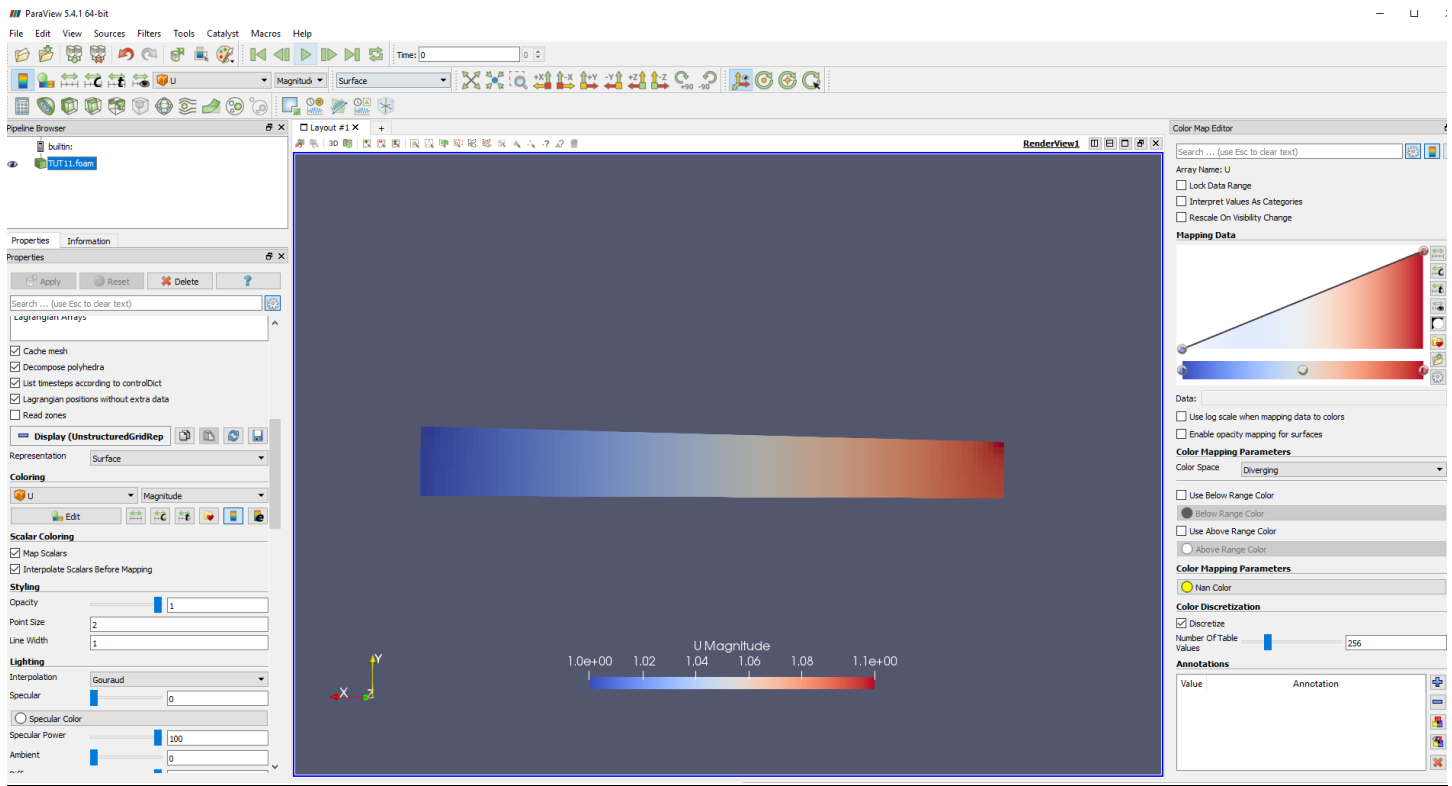
Task 12-

Figure 7 - Modified Velocity Profile without changing k BC
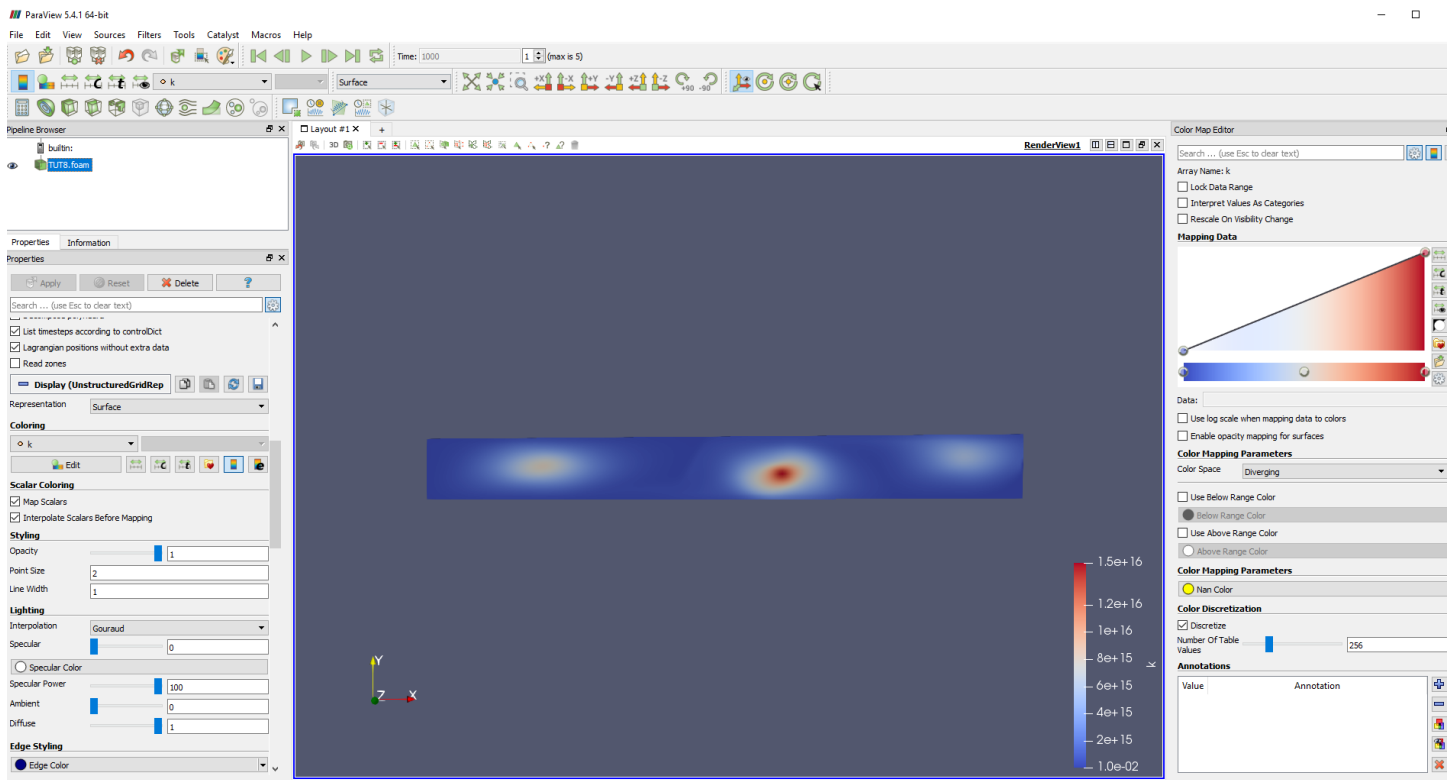

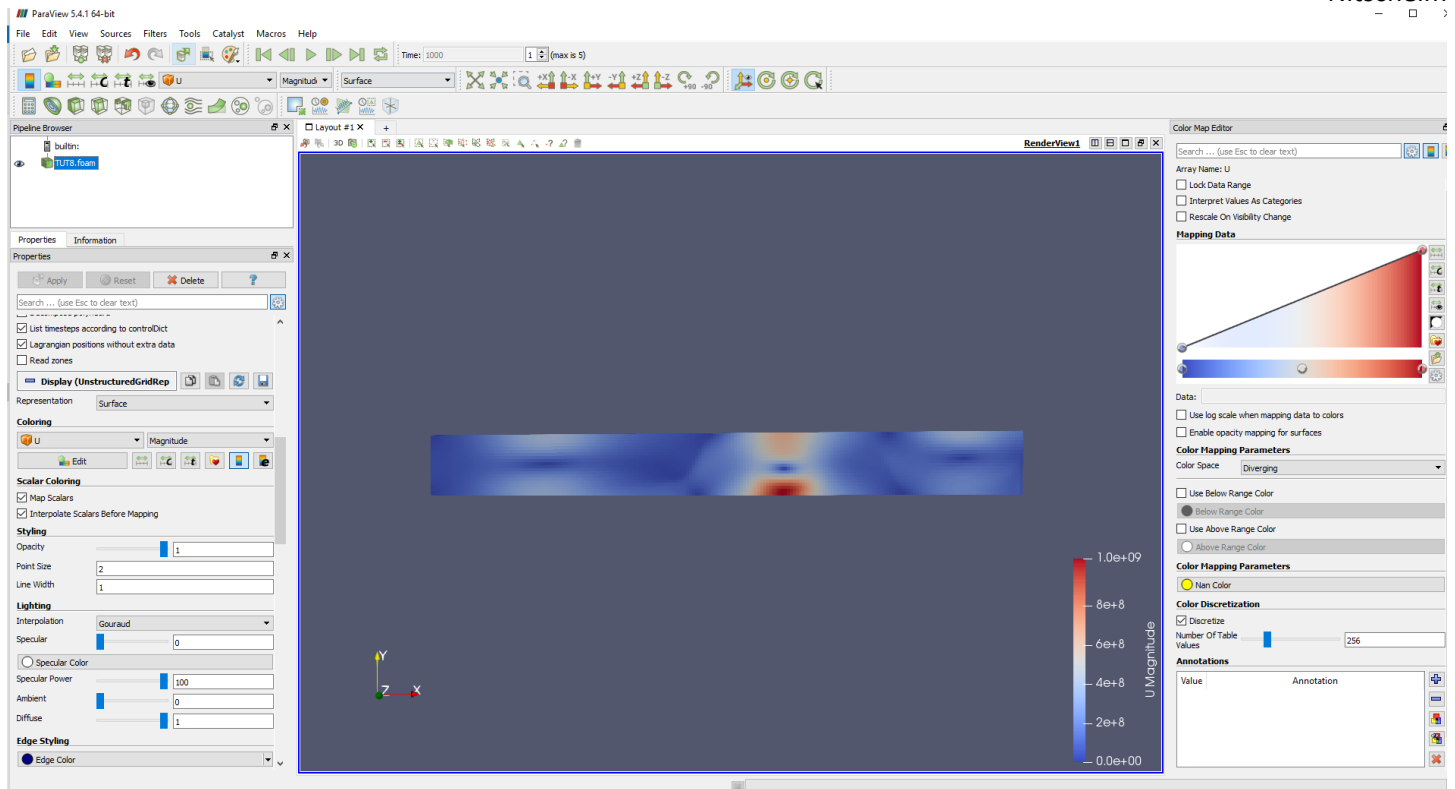*Figure 8 - Very High k-value profile*
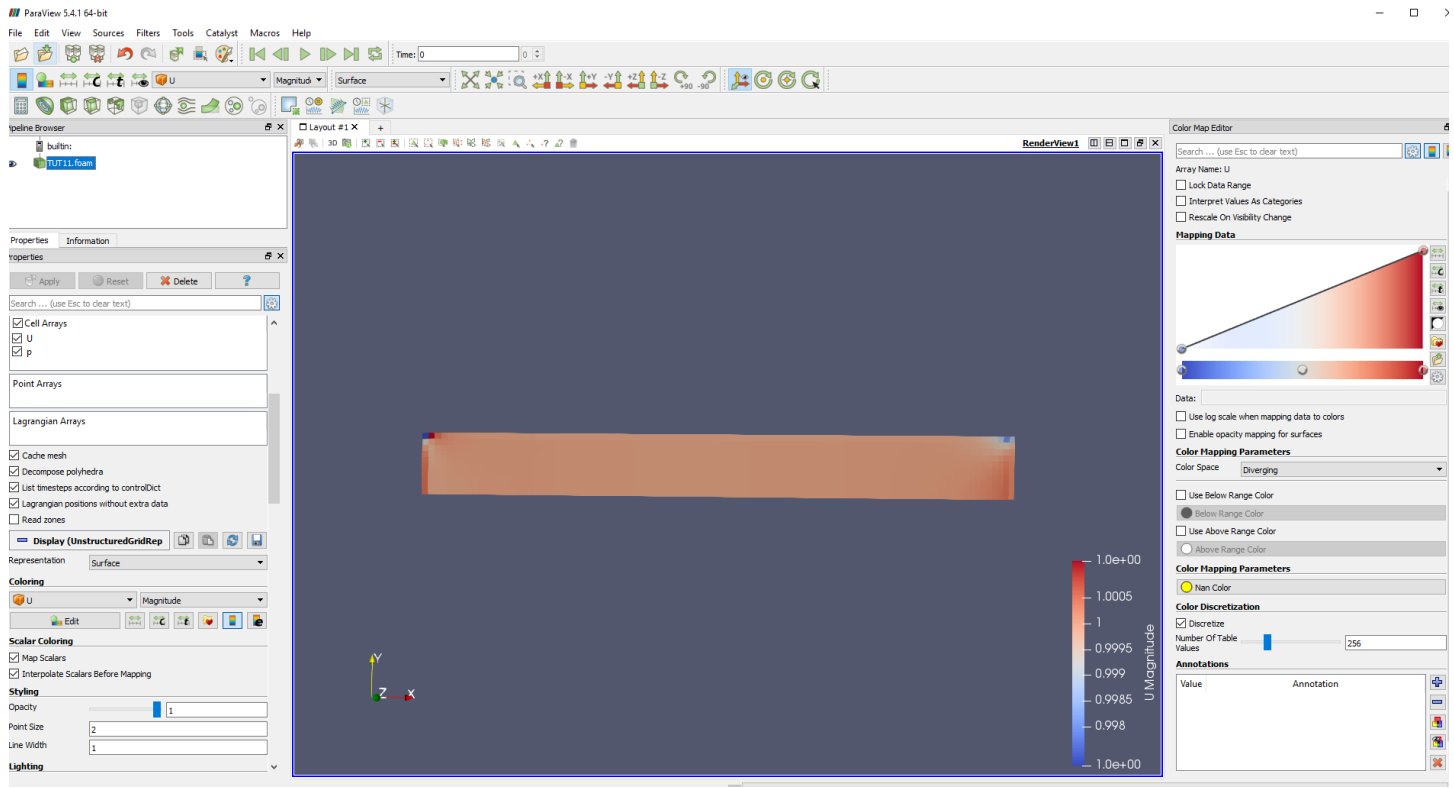
Figure 9 - Velocity profile with a very high k-value

Task 13-

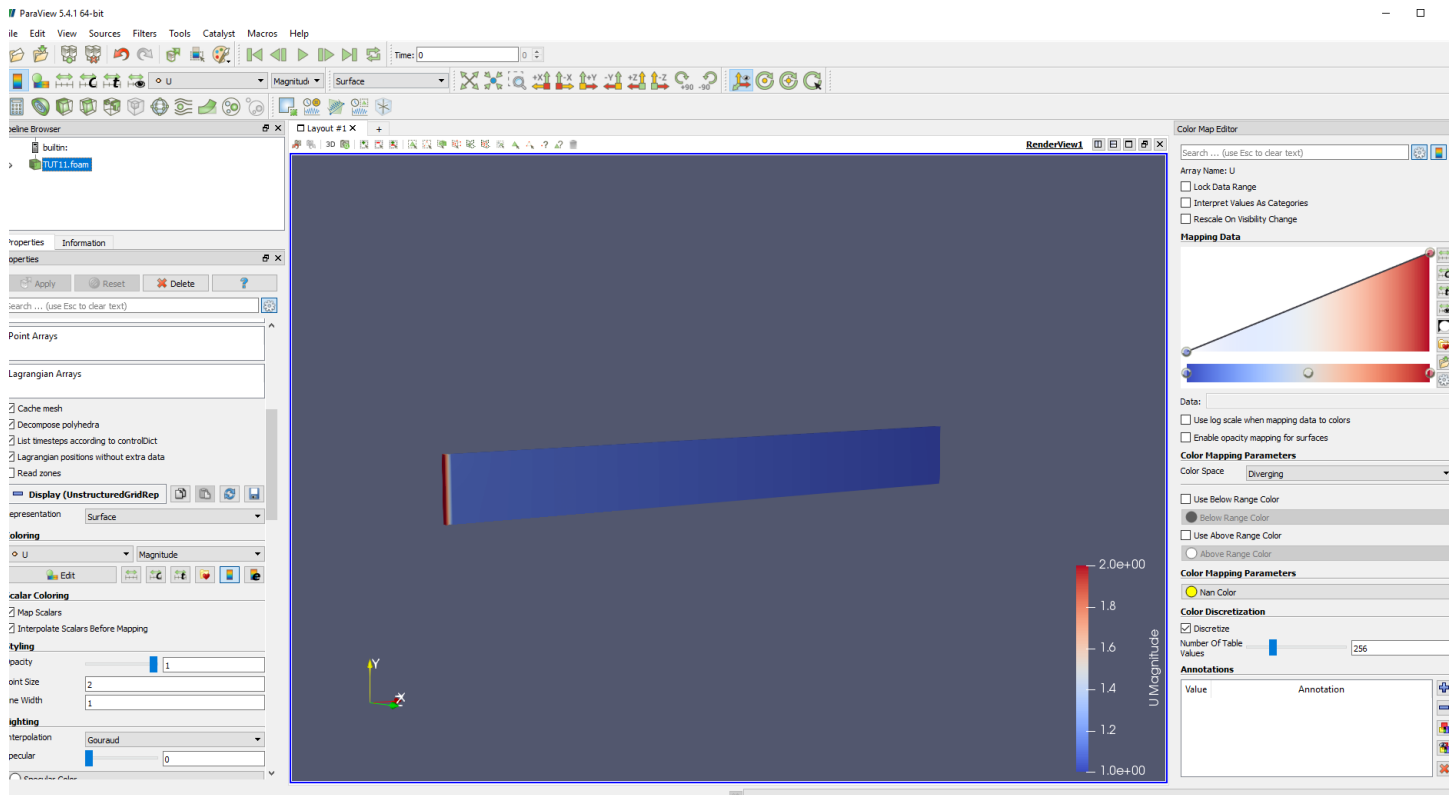*Figure 10 - Velocity profile with a moving wall boundary condition*

Figure 11 - Velocity profile with a symmetry boundary condition

Additional Task 1-

```
/c/Users/User/Desktop/Classes/JUNIOR~1/JANUAR~1/AS32BB~1/ADDITI~1/TUT8                                               —  □  ✕
    gamma2          0.44;
    beta1           0.075;
    beta2           0.0828;
    betaStar        0.09;
    a1              0.31;
    b1              1;
    c1              10;
    F3              false;
}

No MRF models present

yPlus yPlus write:
    writing object yPlus
    patch walls y+ : min = 1.96438, max = 8.96232, average = 2.79808


Time = 2833
Reading field p

Reading field U

Reading/calculating face flux field phi

Selecting incompressible transport model Newtonian
Selecting turbulence model type RAS
Selecting RAS turbulence model kOmegaSST
RAS
{
    RASModel        kOmegaSST;
    turbulence      on;
    printCoeffs     on;
    alphaK1         0.85;
    alphaK2         1;
    alphaOmega1     0.5;
    alphaOmega2     0.856;
    gamma1          0.555556;
    gamma2          0.44;
    beta1           0.075;
    beta2           0.0828;
    betaStar        0.09;
    a1              0.31;
    b1              1;
    c1              10;
    F3              false;
}

No MRF models present

yPlus yPlus write:
    writing object yPlus
    patch walls y+ : min = 1.96438, max = 8.96228, average = 2.79808


End

S172-1+User@S172-1 MINGW64 OpenFOAM-5.x /c/Users/User/Desktop/Classes/JUNIOR~1/JANUAR~1/AS32BB~1/ADDITI~1/TUT8
$
```

Figure 12 - yPlusMax data shown at the bottom
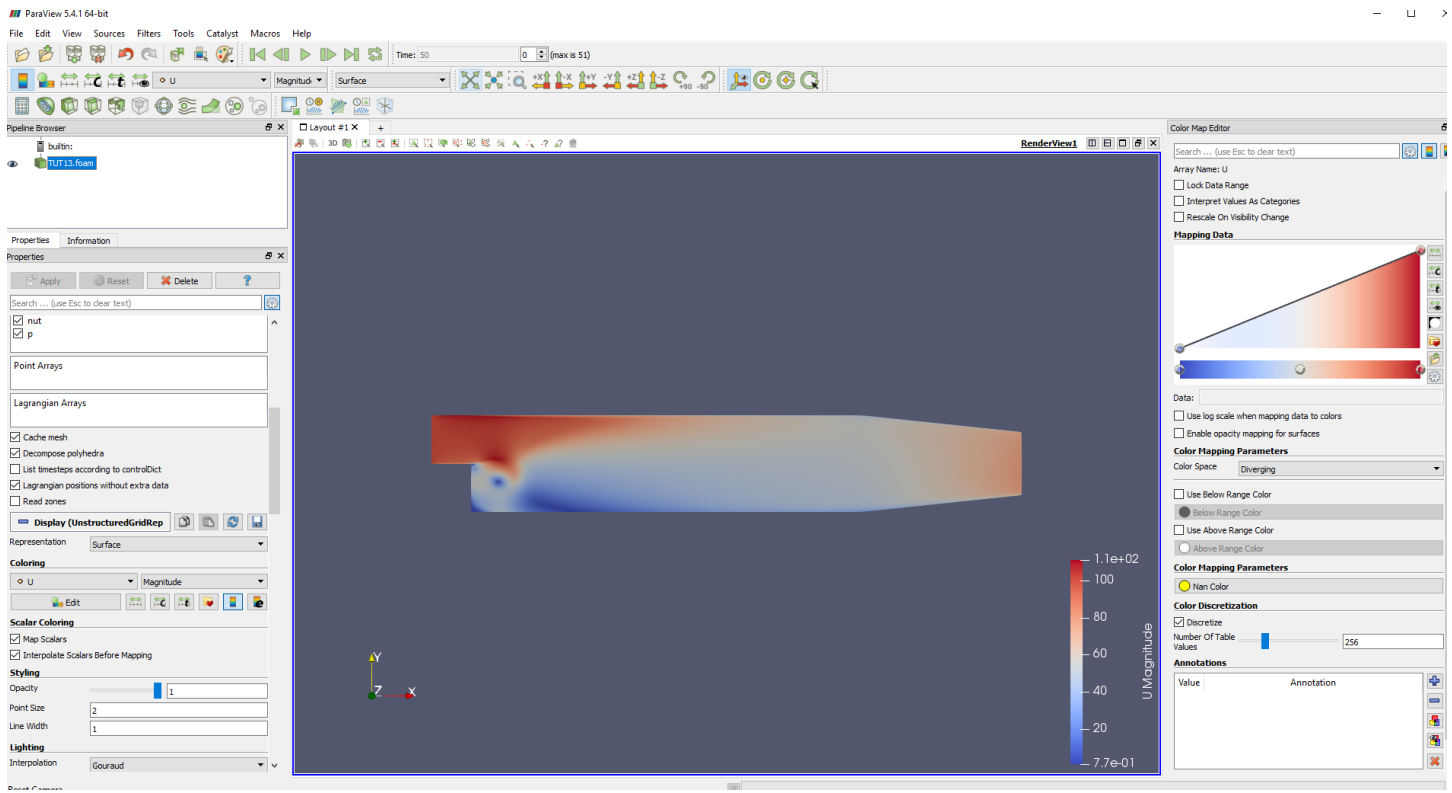
Additional Task 2-

Figure 13 - Simulation with turbulence and recirculation zone, time 1
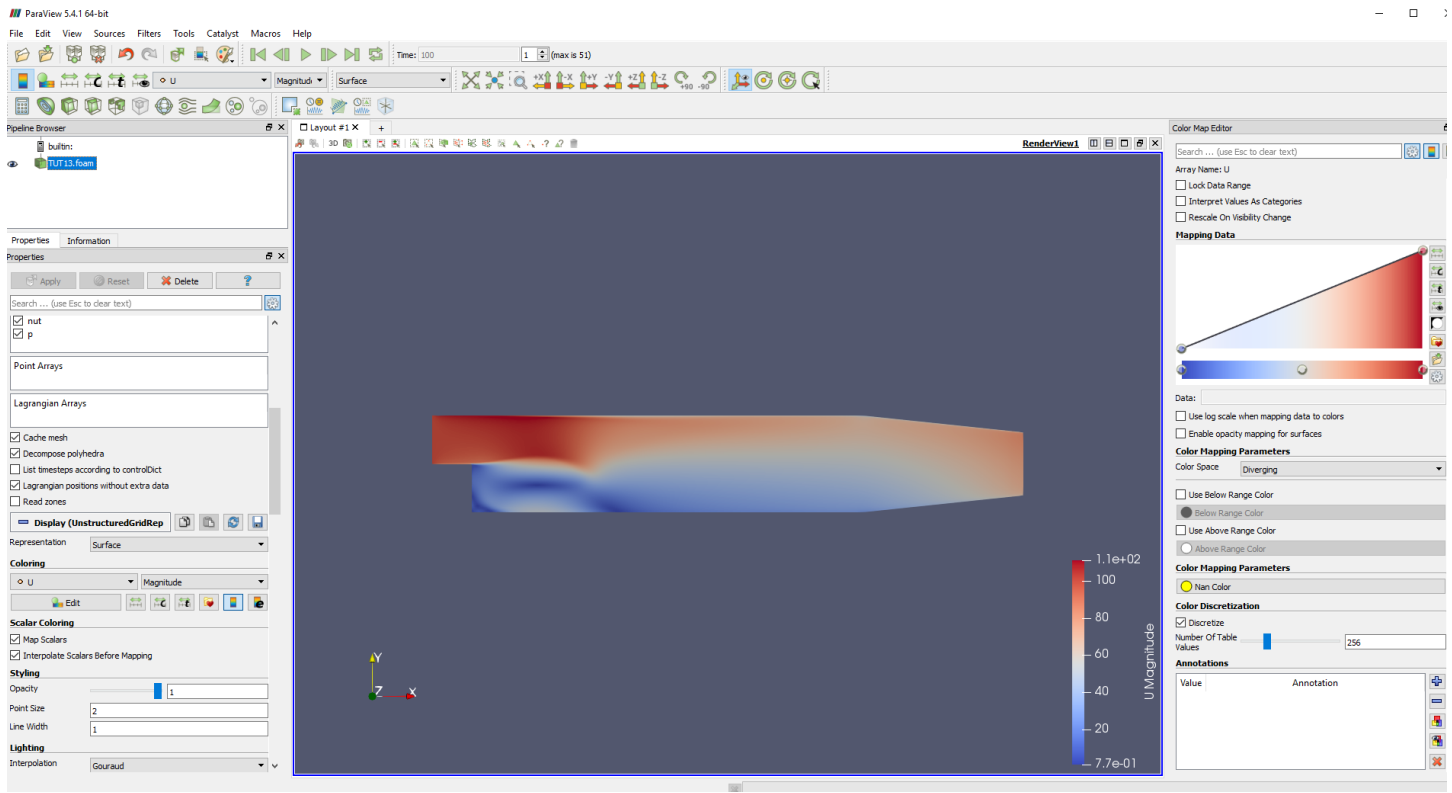

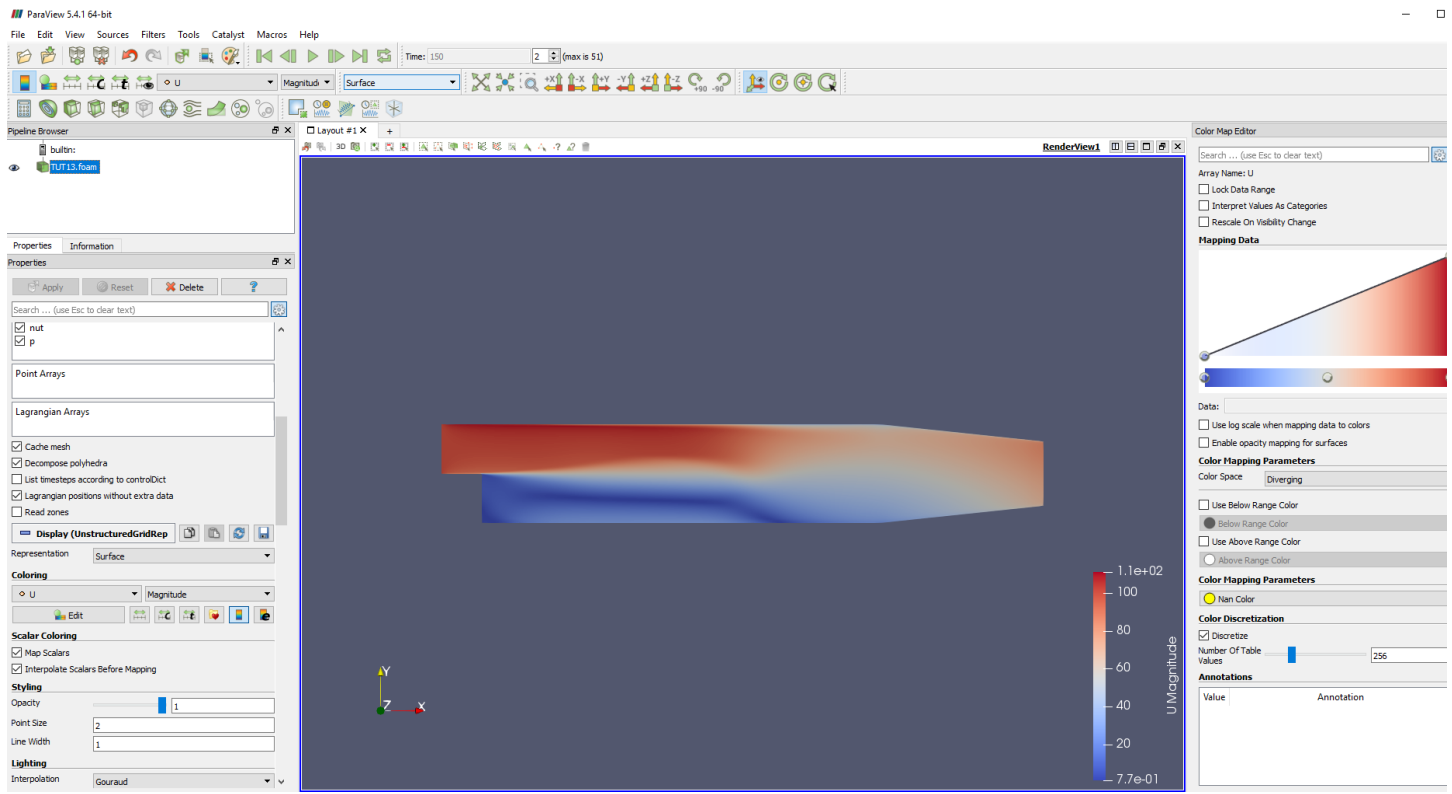*Figure 14 - Simulation with turbulence and recirculation zone, time 2*

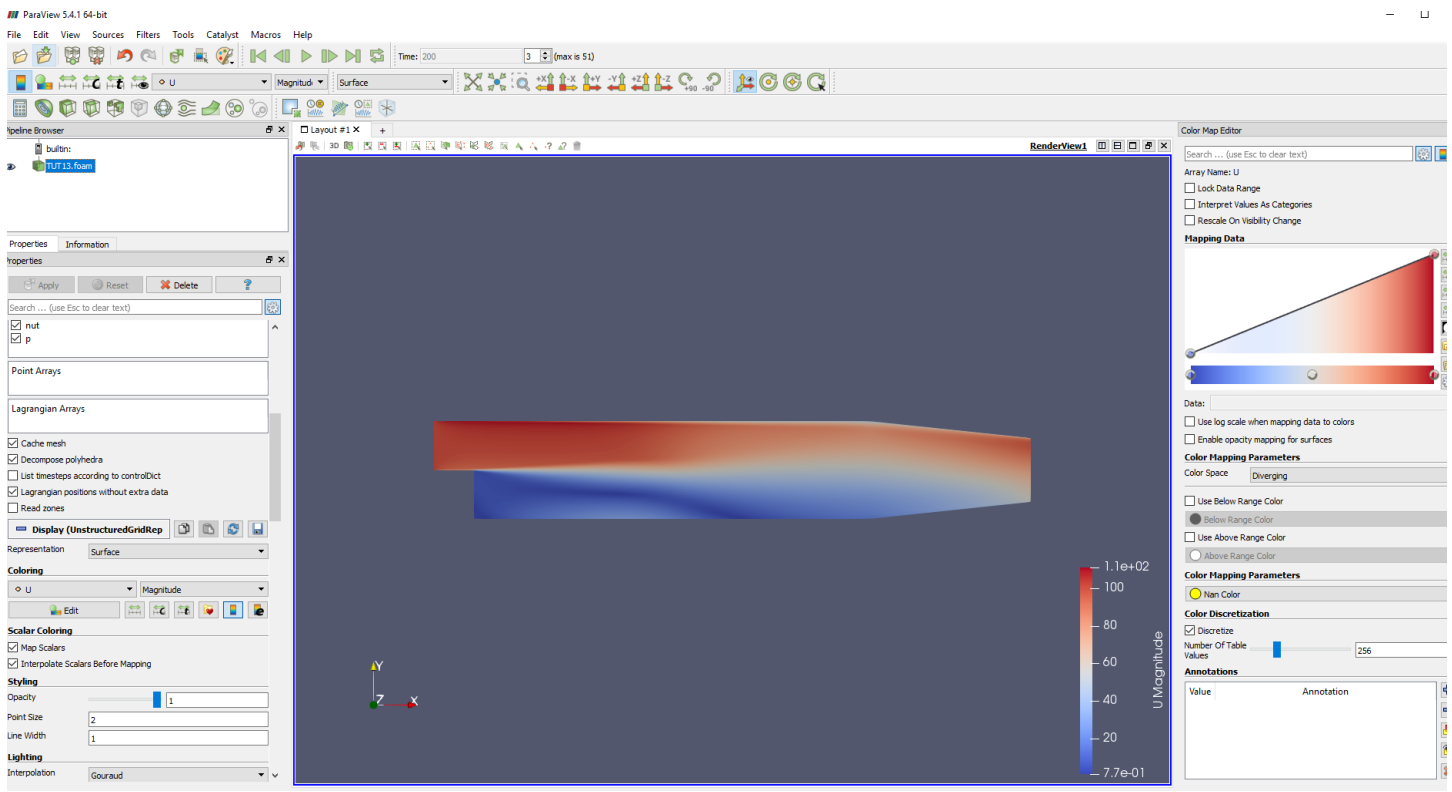*Figure 15 - Simulation with turbulence and recirculation zone, time 3*

Figure 16 - Simulation with turbulence and recirculation zone, time 4
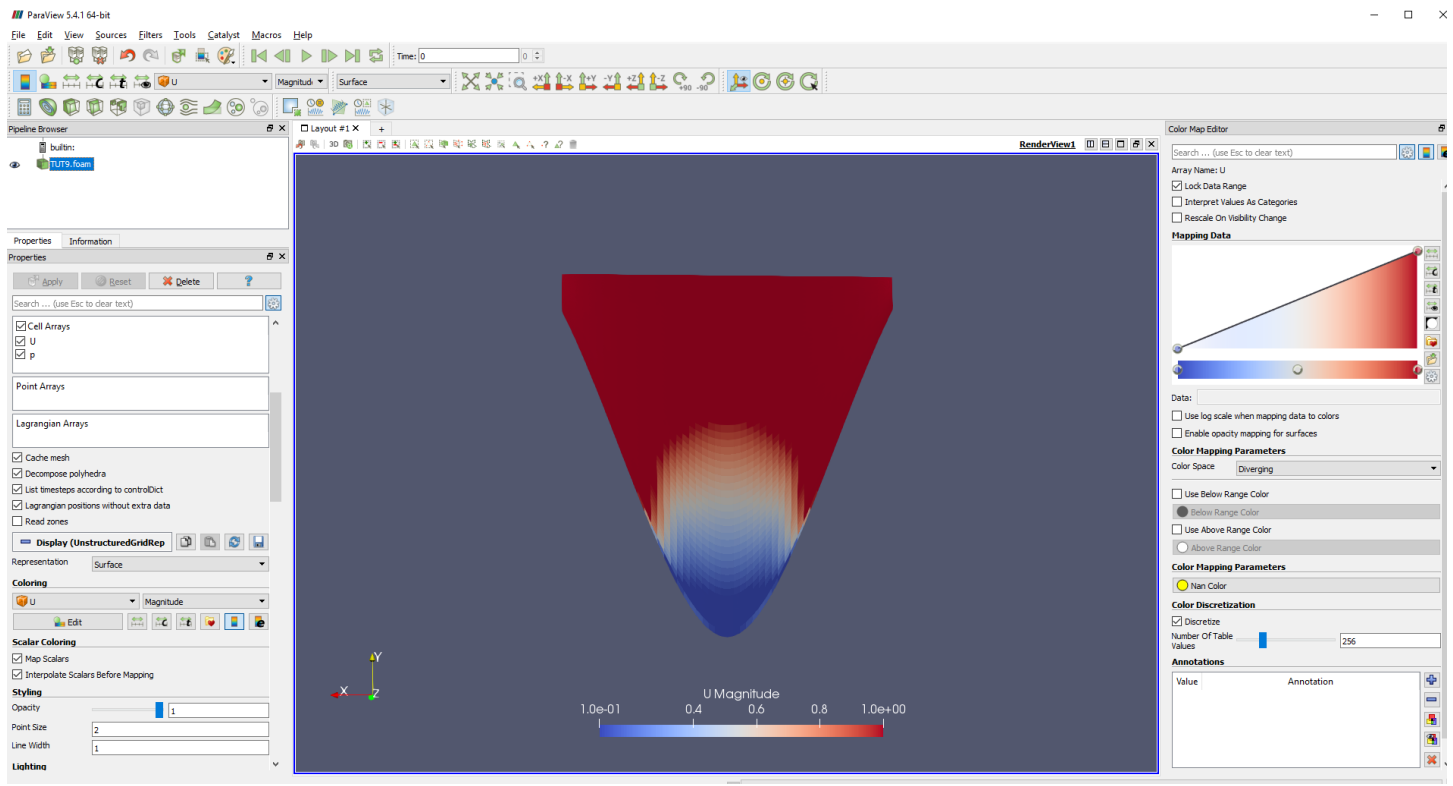
Additional Task 3-

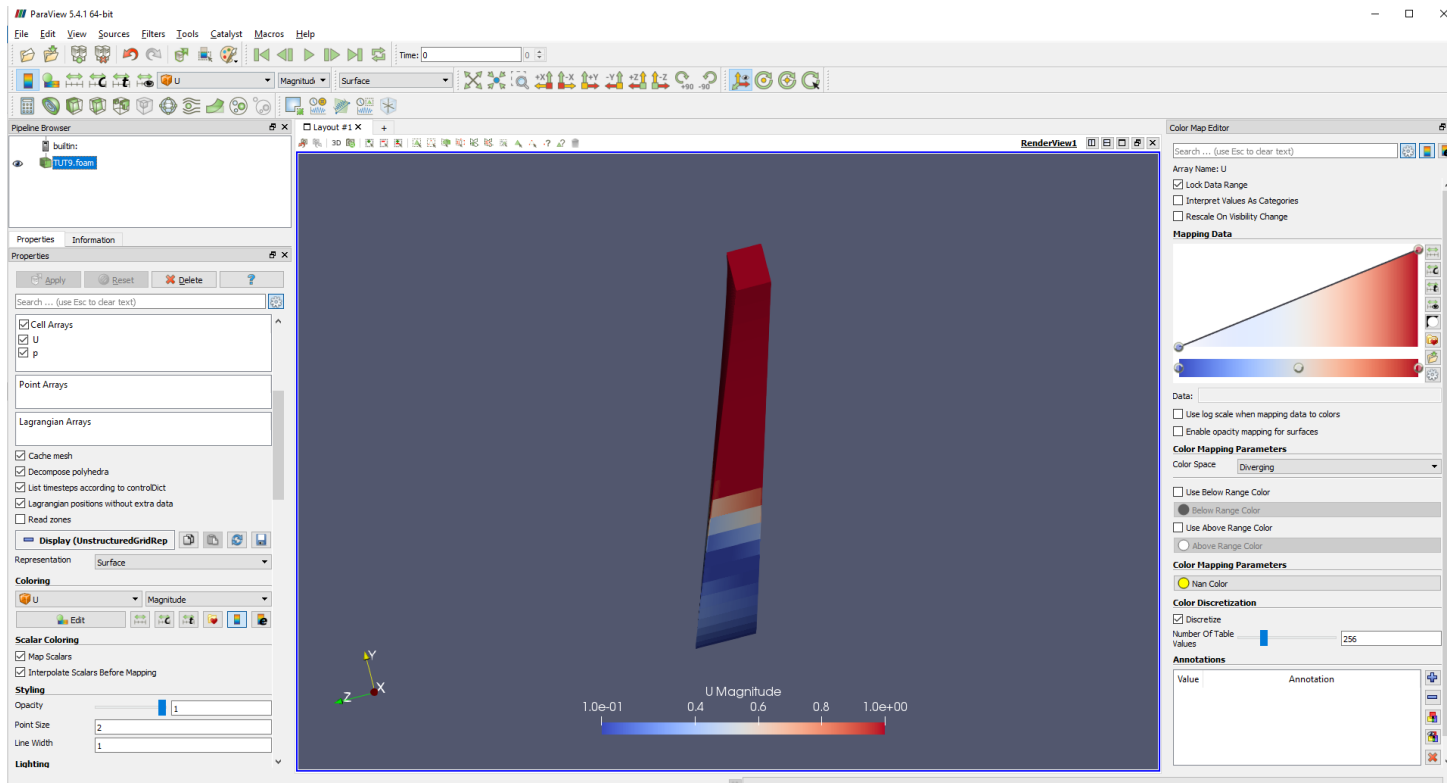*Figure 17 - Front view of original geometry velocity profile*
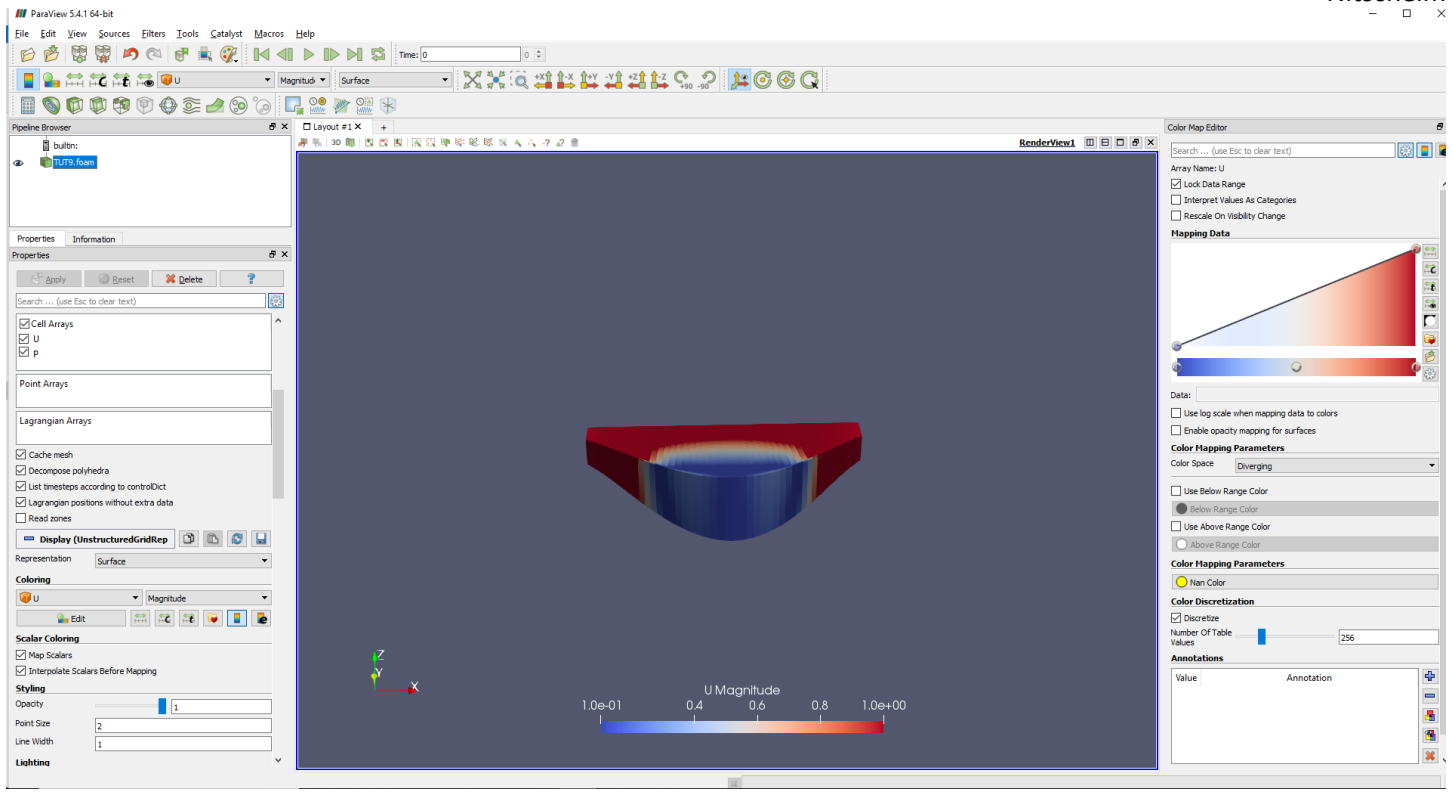

Figure 18 - Side view of original geometry velocity profile

Figure 19 - Top view of orignal geometry velocity profile