ACFD

ASSIGNMENT – 3

Backward Facing Step

(Semi Implicit by Upwind Scheme & Quick Scheme)

GIVEN:

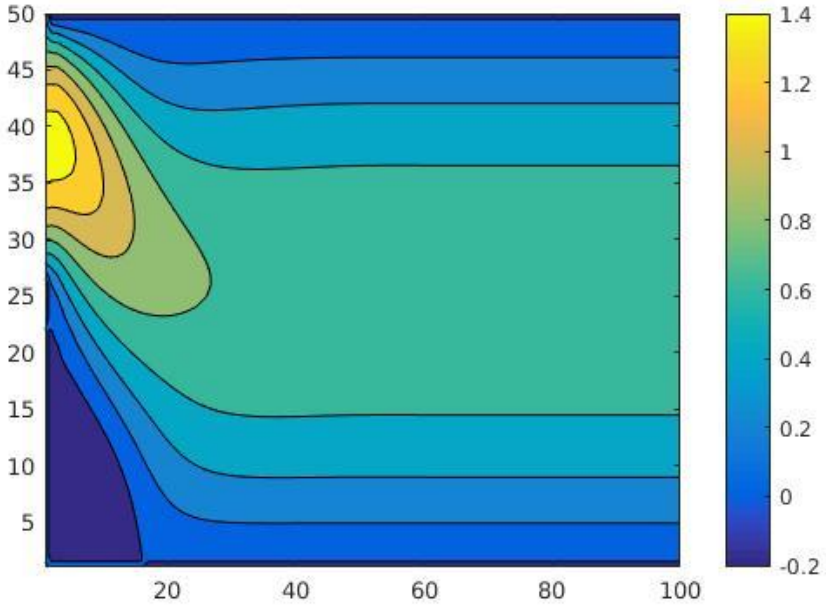
1. Nx = 100, Ny=50
2. Length along x = 10, Length along y = 1
3. Re = 100, 400, 800
4. Steady State accuracy taken – 10^{-3}

Comparison between First Order Upwind Scheme & Quick Scheme

CASE 1 FOR RE = 100

Recirculation length = 1.515

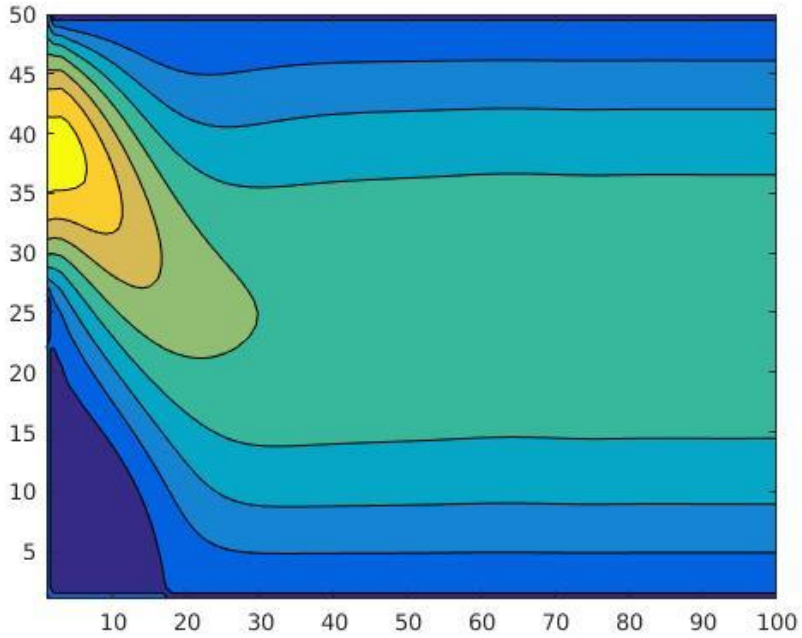
Contour for u



CASE 1 FOR RE = 100

Recirculation length = 1.6161

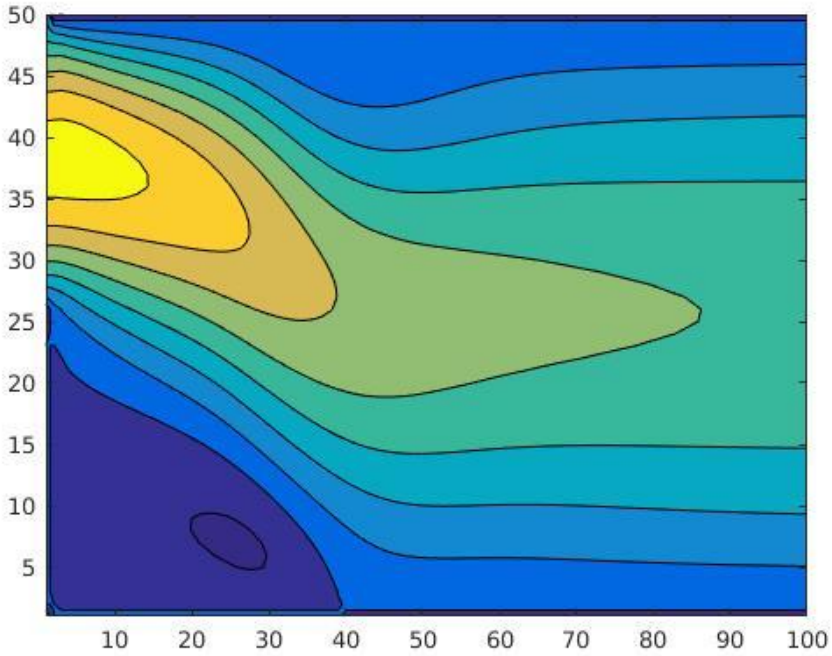
Contour for u



CASE 2 FOR RE = 400

Recirculation length = 3.7373

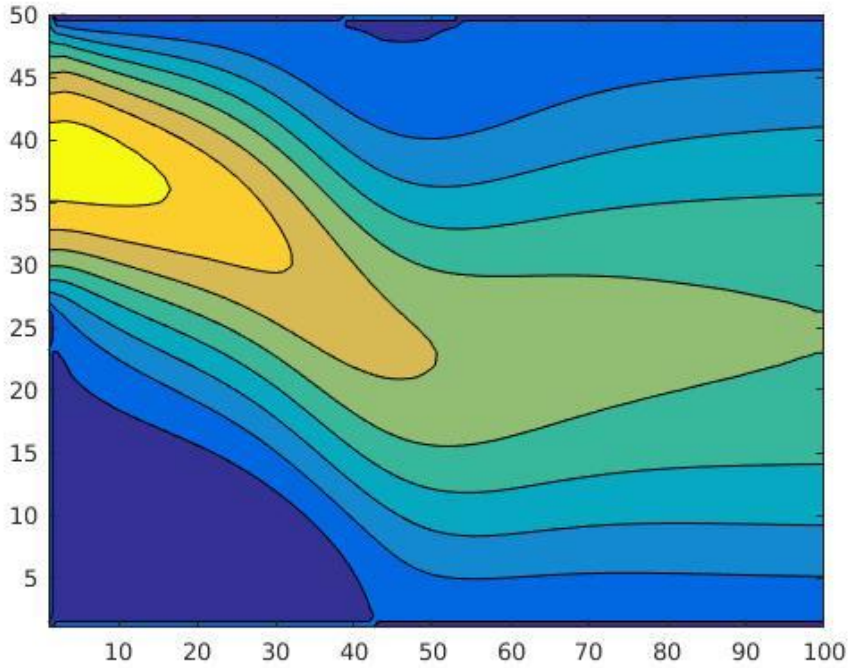
Contour for u



CASE 2 FOR RE = 400

Recirculation length = 4.1414

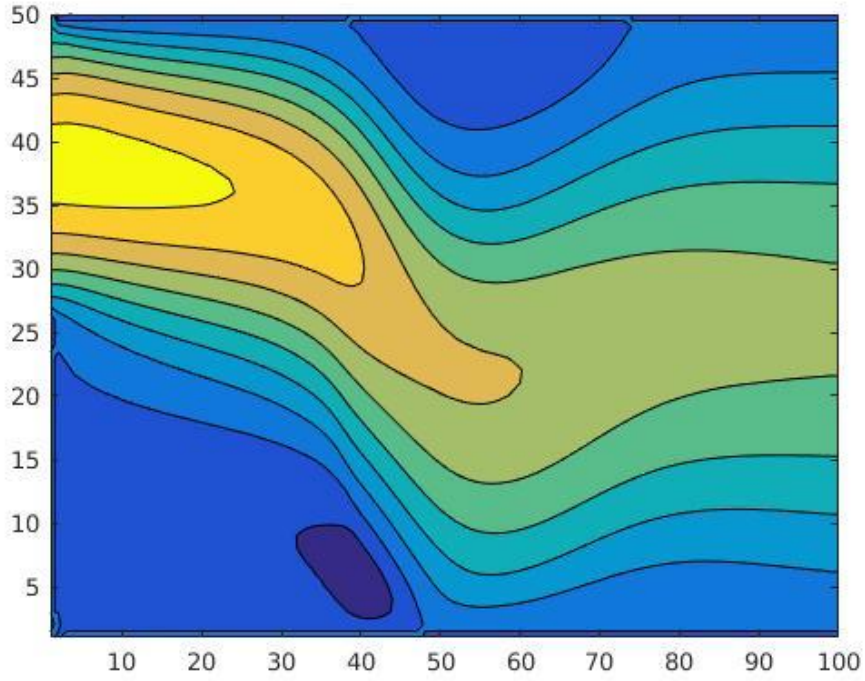
Contour for u



CASE 3 FOR RE = 800

Recirculation length = 4.5454

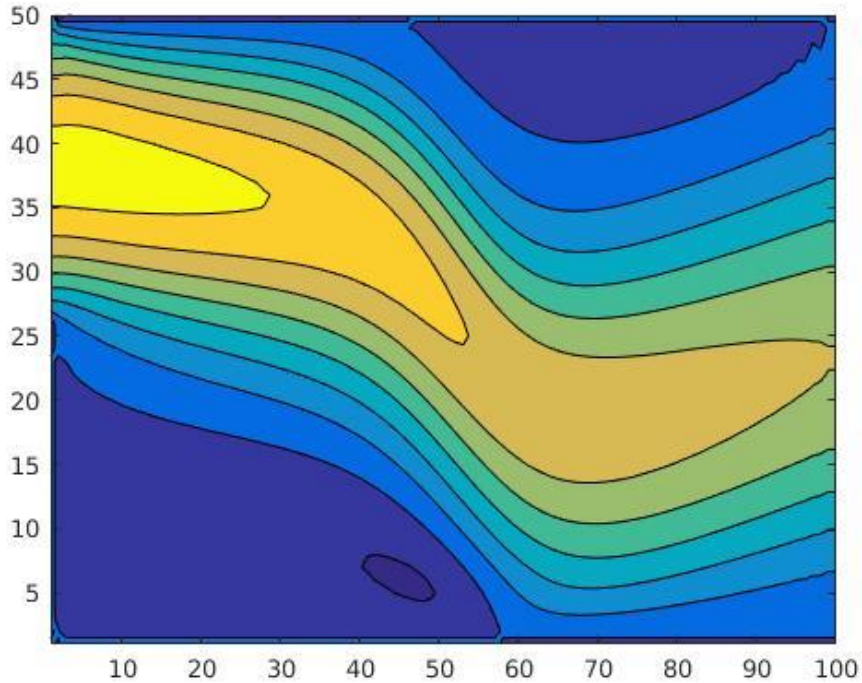
Contour for u



CASE 3 FOR RE = 800

Recirculation length = 5.5556

Contour for u



CONCLUSION:

1. We see one more recirculation near the top surface at Reynolds no 800 or more, it is not seen for Reynolds no less than 800
2. With the increase in Reynolds no the parabolic profile increases further to some extent.
3. Recirculation length increases as we increase the Reynolds no.
4. The quick scheme gives more accurate result then first order upwind.
5. We get faster results for implicit schemes as we can increase the time step.