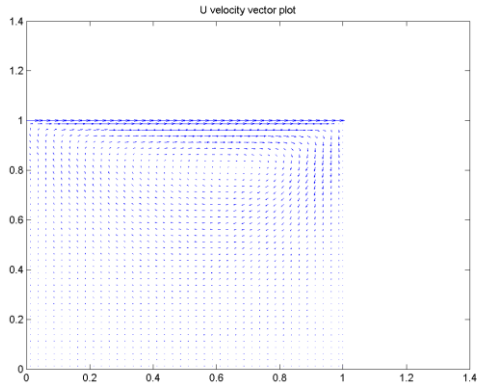
DEPARTMENT OF MECHANICAL ENGINEERING
INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

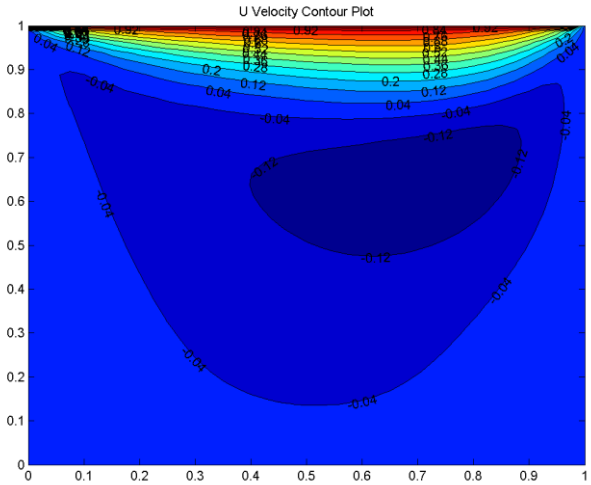
ME415: Computational Fluid Dynamics & Heat Transfer

Assignment # 3: Computational Fluid Dynamics for Cartesian Geometry on a Uniform

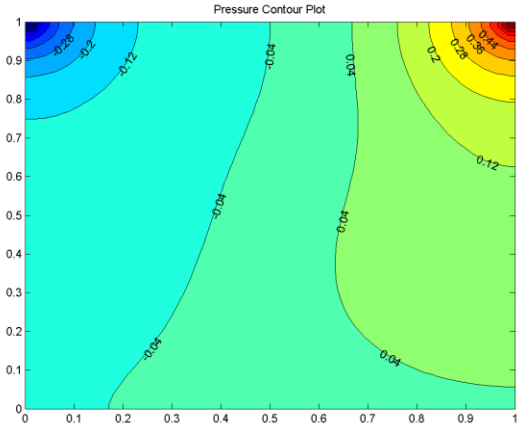
Answer Sheet



(a)



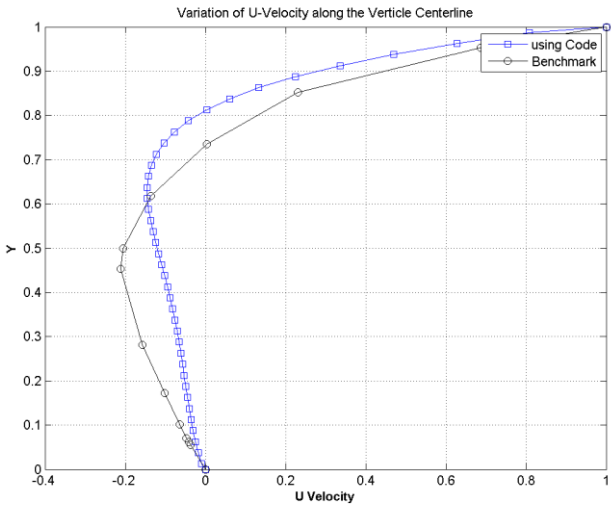
(b)

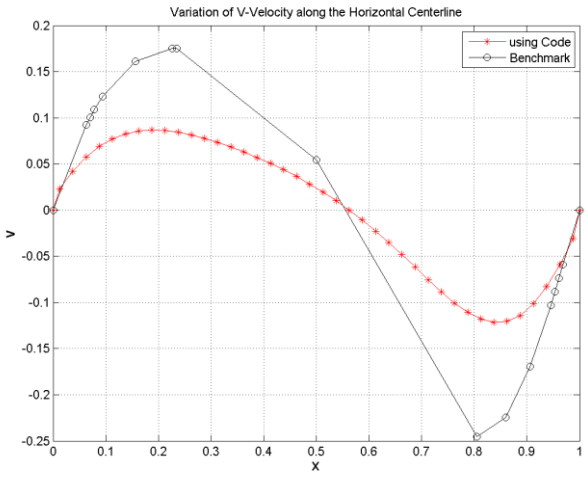


(c)

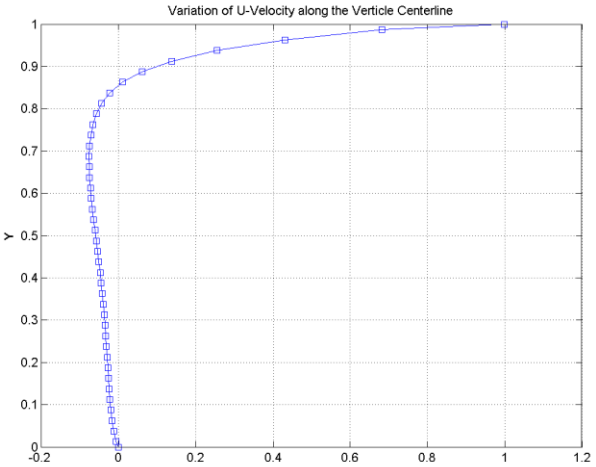
a) Plot and discuss the variation of U-velocity along the vertical and V-velocity along the horizontal centerline of the cavity and its comparison with the benchmark results, on a grid size of *32×32*, at *Re=100* and *400* (2+2 figures). Overlap the results obtained by Ghia et al. (1982), with symbols for published and line for present results.

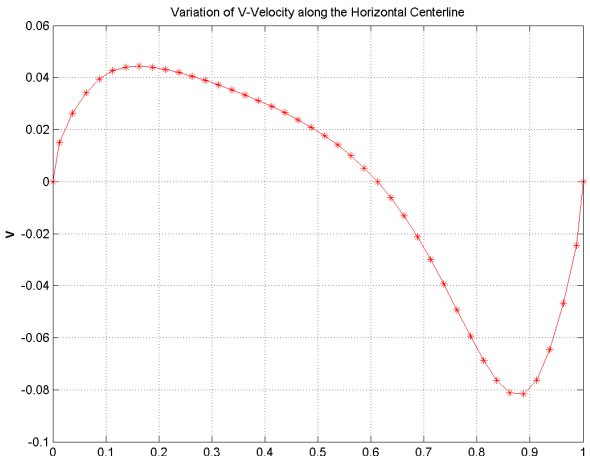
Re = 100





Re = 400





- From the U-velocity plot along the centreline, it can be seen that u is 1 at the top, decreases gradually and becomes negative after some time and then increases and becomes zero at the bottom.
- U-velocity contour shows that a circular flow is formed inside the cavity
- The V-velocity plot along the centreline follows a curve similar to a sine wave. V velocity is zero at both left and right boundary.
- Pressure contour curve depicts that as we move right, pressure decreases and may become negative.
- As the epsilon_steadiness is decreases, results become more accurate and close to the benchmark results.
- As the size of the grid is increased, accuracy of results increase, but the time for simulation also increases.
- Results for Re = 100 and Re = 400 are similar but actual values are different due to change in viscosity.