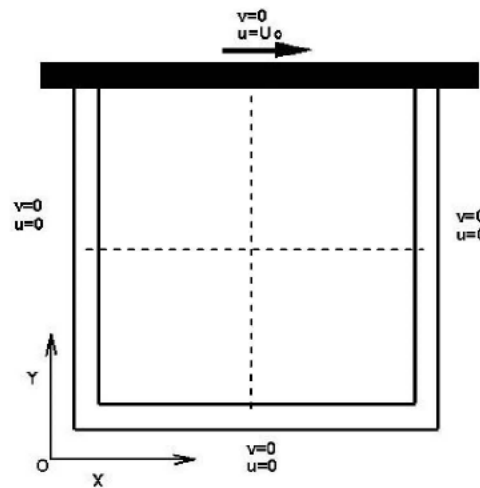


Assignment-4

Two-dimensional flow field in a geometry shown below is required to be simulated. The aspect ratio of the cavity is unity. The flow is incompressible viscous and is driven by uniform translation of the moving upper lid.



Solve for the flow pattern in the above geometry for the Reynolds numbers (based on cavity dimension and the lid velocity) of 100 and 400.

- 1) Discretize the non-dimensional vorticity-stream function equations and the associated boundary conditions.
- 2) Consider a grid size of 81×81 and 101×101 grid points for $Re = 400$.
- 3) Consider a grid size of 81×81 grid points for $Re = 100$.

Your report should contain the following results and the related discussions

- 1) Problem Definition.
- 2) Method of solution including governing differential equations (GDE), discretization and Boundary conditions (BCs).
- 3) Streamlines and vorticity contours inside the cavity for the two cases (grid size: 81×81).
- 4) Line plots for the following cases.
 - a) x and y direction variations of both the velocities along the dotted lines for $Re = 400$ and all (two plots for two directions, each plot will have two lines for two different grids).
 - b) x and y direction variations of both the velocities along the dotted lines for both Re (same plot, grid size: 81×81).
 - c) Comparison of results at $Re = 100$ with the supplied result as in (b).
