Programming Assignment 3: Incompressible Flow

Given the domain $(x, y) \in [0, 1] \times [0, 1]$ (see figure below) and the equations for incompressible flow with the conditions that that two boxes have velocities of u=1 for the box at the left and u=-1 for the box at the right, solve for the fluid velocity using the pressure correction technique with MAC grid etc. presented in class with a semi-Lagrangian update for the $\mathbf{V}^*$ updates. Use Dirichlet BC's for the pressure around the boundary (with $p = 0$) and Neumann conditions for pressure ($p_x = 0$) on cells that intersect the two boxes with velocity constraints. The boxes have edge length .2 and are centered at (.2,.5) and (.8,.5) respectively.

I. Hint

If the semi-Lagrangian velocity causes you to look off the grid, simply set the velocity to zero.

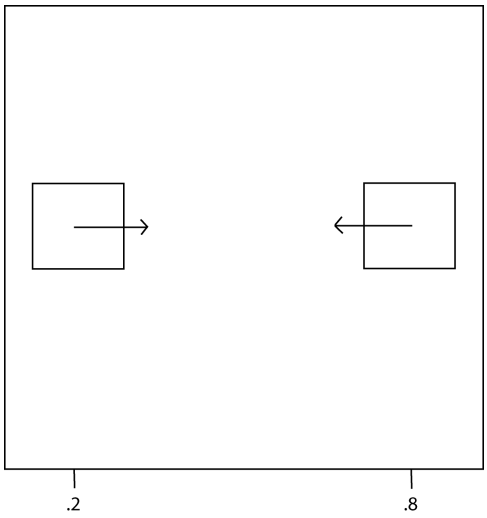

Fig. 1.