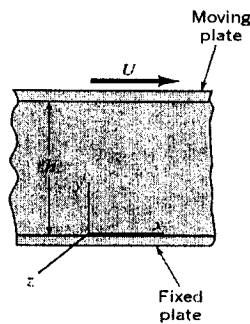


1. Two horizontal, infinite, parallel plates are spaced a distance h apart. A viscous liquid is contained between the plates. The bottom plate is fixed and the upper plate moves parallel to the bottom plate with a velocity U , as shown in the following figure. The liquid motion is caused by the liquid being dragged along by the moving boundary. There is no pressure gradient in the direction of flow.



- (a) Assume the laminar and steady flow. Start with the Navier-Stokes equations, and reduce them to find the proper differential equation to satisfy this problem. (5%)
- (b) Please specify proper boundary conditions. (6%)
- (c) Determine the velocity distribution between the plates. (5%)
- (d) Determine an expression for the flow rate passing between the plates (for a unit width). Express your answer in terms of h and U . (4%)