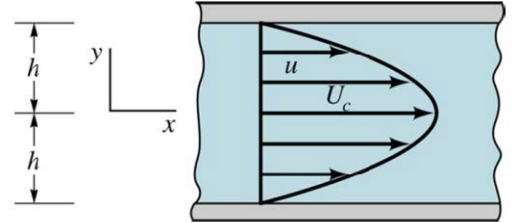


November 6, 2015

NAME

Fluids-ID

Quiz 10. Oil ($\mu = 0.4 \text{ N}\cdot\text{s}/\text{m}^2$) flows between two fixed horizontal infinite parallel plates with a spacing of 5 mm. The flow is laminar and steady with a constant pressure gradient $dp/dx = -900 \text{ N}/\text{m}^3$. Determine the shear stress $\tau = \mu \partial u / \partial y$ at $y = h$, by solving Navier Stokes equation.



Continuity:

$$\frac{\partial u}{\partial x} + \frac{\partial v}{\partial y} = 0$$

Navier Stokes:

$$\rho \left(\frac{\partial u}{\partial t} + u \frac{\partial u}{\partial x} + v \frac{\partial u}{\partial y} \right) = - \frac{dp}{dx} + \mu \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} \right)$$

Note: Attendance (+2 points), format (+1 point)