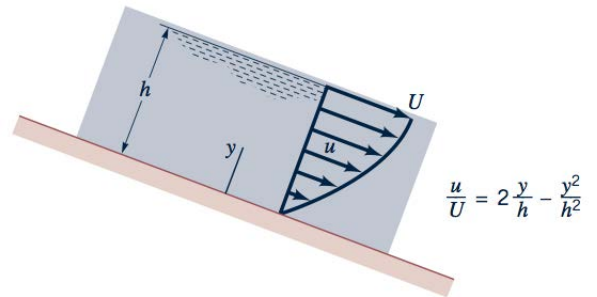


September 7, 2016

NAME _____

Quiz 1. A layer of water flows down an inclined fixed surface with the velocity profile shown in Figure. Determine the magnitude and direction of the shearing stress that the water exerts on the fixed surface for $U = 2 \text{ m/s}$, $h = 0.1 \text{ m}$ and $\mu = 4.48 \times 10^{-3} \frac{\text{Ns}}{\text{m}^2}$.



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

Solution:

$$\tau = \mu \frac{du}{dy}$$

(+4 points)

$$\frac{du}{dy} = U \left(\frac{2}{h} - \frac{2y}{h^2} \right)$$

(+1 point)

$$\left(\frac{du}{dy} \right)_{y=0} = \frac{2U}{h}$$

(+1 point)

$$\tau_{wall} = \mu \frac{2U}{h} = 4.48 \times \frac{10^{-3} \text{Ns}}{\text{m}^2} \times 2 \times \frac{2 \text{ m}}{0.1 \text{ m}} = 1.792 \times 10^{-1} \frac{\text{N}}{\text{m}^2} \text{ acting in direction of the flow}$$

(+1 point)