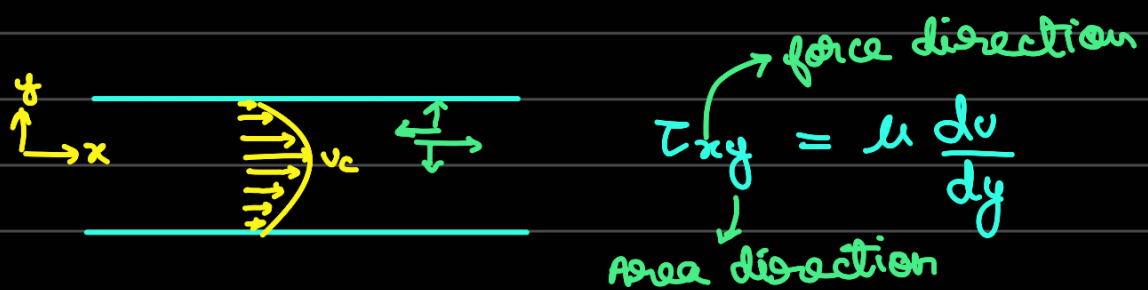


Day - 14



No slip: The fluid assumes the wall velocity at the surface.

$$u = \frac{1}{2\mu} \left(-\frac{dp}{dx} \right) \left(\frac{h}{2} \right)^2 \left[1 - \left(\frac{y}{h/2} \right)^2 \right]$$

$$u_{avg} = \frac{1}{h/2} \int_0^{h/2} u(y) dy$$

$$= \frac{2}{h} \times \frac{1}{2\mu} \times -\frac{dp}{dx} \int_0^{h/2} \left[\left(\frac{h}{2} \right)^2 - y^2 \right] dy$$

$$= -\frac{1}{\mu h} \frac{dp}{dx} \left[\left(\frac{h}{2} \right)^3 - \frac{\left(\frac{h}{2} \right)^3}{3} \right]$$

$$= -\frac{1}{\mu h} \frac{dp}{dx} \times \frac{2}{3} \times \frac{h^3}{8}$$

$$= -\frac{h^2}{12\mu} \frac{dp}{dx} = \frac{2}{3} v_c$$