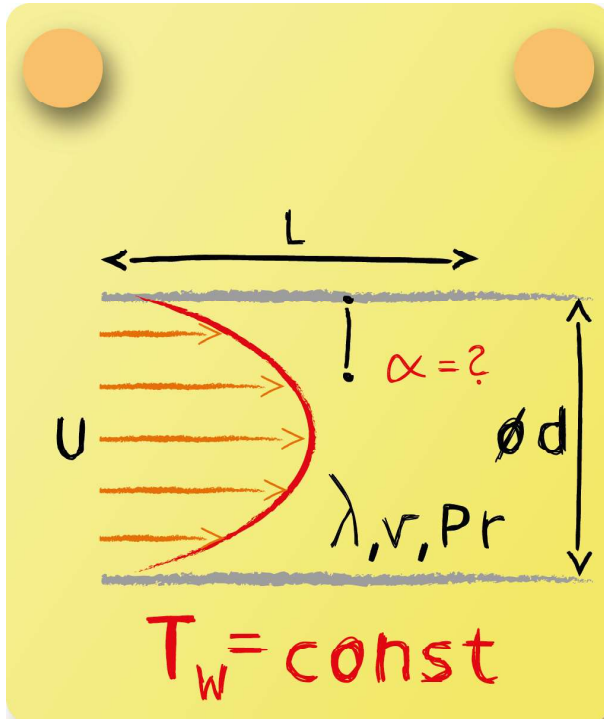


## Heat Transfer Correlation 13.1



A fluid flows through a pipe with isothermal surface. Calculate the mean heat transfer coefficient  $\bar{\alpha}$ .

Reynolds number:

$$\text{Re}_d = \frac{u \cdot d}{\nu} = 1400$$

Thermal entry length:

$$L_{\text{th}} = 0.05 \cdot \text{Re}_d \cdot \text{Pr} \cdot d = 4.97 \text{ m} > L$$



Nusselt number:

$$\overline{\text{Nu}}_d = \left( 3.66 + \frac{0.0677 \cdot (\text{Re}_d \cdot \text{Pr} \cdot \frac{d}{L})^{1.33}}{1 + 0.1 \cdot \text{Pr} \cdot (\text{Re}_d \cdot \frac{d}{L})^{0.83}} \right) \cdot \left( \frac{\eta}{\eta_w} \right)^{0.14} = 5.72$$

Heat transfer coefficient:

$$\bar{\alpha} = \frac{\overline{\text{Nu}}_d \cdot \lambda_f}{d} = 1.49 \text{ W/m}^2\text{K}$$