November 22, 2013

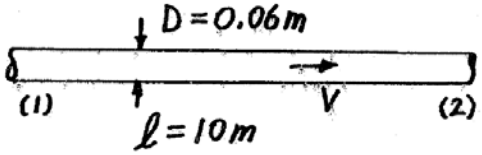
NAME

Fluids-ID

Quiz 12. Water flows through a horizontal 60-mm-diameter galvanized iron pipe at a rate of 0.02 m^3/s. Determine the pressure drop Δp between sections (1) and (2) shown below, if:

a) the pipe is new with roughness ϵ = 0.15 mm
b) the pipe is old with roughness ϵ = 0.30 mm

(ρ = 999 kg/m^3, $\nu = 1.12 \times 10^{-6}$ m^2/s)



Energy equation:

$$\frac{p_1}{\gamma} + \frac{V_1^2}{2g} + z_1 = \frac{p_2}{\gamma} + \frac{V_2^2}{2g} + z_2 + f\frac{\ell}{D}\frac{V^2}{2g}$$

Friction factor:

$$f = \frac{1.325}{\left\{\ln\left[\left(\frac{1}{3.7}\frac{\epsilon}{D}\right) + \left(\frac{5.74}{Re^{0.9}}\right)\right]\right\}^2}$$

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