

MEET 330 Homework 1.3

Problems: 79, 82, 91

$$6.79 \quad \frac{1}{2} + \frac{P_A}{2} + \frac{V_A^2}{2g} + Z_1 = \frac{P_B}{2} + \frac{V_B^2}{2g} + Z_B + \frac{1}{2} + \frac{1}{2}$$

$$1 = 2x = 2 \frac{1}{3} \text{ ft}$$

Ask about

$$A_A V_A = A_B V_B$$

$$\beta_0 = 0.90 \cdot 62.4 = 56.16 \text{ lb/ft}^3$$

in class note?

$$\left(\frac{\pi D_A^2}{4} \right) V_A = \left(\frac{\pi D_B^2}{4} \right) V_B$$

$$\beta_B = 13.54 \cdot 62.4 = 844.296 \text{ lb/ft}^3$$

$$V_A = \left(V_B \left(\frac{\pi D_B^2}{4} \right) \right) / \left(\frac{\pi D_A^2}{4} \right) \quad V_B = \left(V_A \left(\frac{\pi D_A^2}{4} \right) \right) / \left(\frac{\pi D_B^2}{4} \right)$$

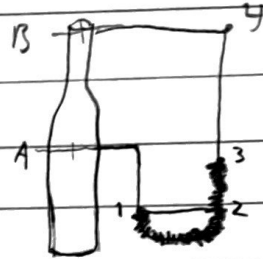
$$V_A = \frac{1}{4} V_B$$

$$V_B = 4 V_A$$

MET330 Homework 1.3 (continued)

6.82 $\rho = 55 \text{ lb/ft}^3$, $D_A = 4 \text{ in}$, $D_B = 2 \text{ in}$

$$Q = AV$$



$$h_A + \frac{P_A}{\rho} + \frac{V_A^2}{2g} + z_A = \frac{P_B}{\rho} + \frac{V_B^2}{2g} + z_B + h_L + h_R$$

$$V_A A_A = V_B A_B$$

$$V_A \left(\frac{\pi D_A^2}{4} \right) = V_B \left(\frac{\pi D_B^2}{4} \right)$$

$$V_A = 0.25 V_B, V_B = 4 V_A$$

$$\frac{P_A}{\rho} + \frac{V_A^2}{2g} + z_A = \frac{P_B}{\rho} + \frac{(4V_A)^2}{2g} + z_B$$

$$\frac{16V_A^2 - V_A^2}{2g} = \frac{P_A - P_B}{\rho} + z_A - z_B$$

$$\frac{15V_A^2}{2g} = \frac{P_A - P_B}{\rho} + z_A - z_B$$

$$V_A = \sqrt{\left(\frac{2g}{15} \right) \left(\frac{P_A - P_B}{\rho} + z_A - z_B \right)}$$

$$P_1 = P_2$$

$$P_1 = P_A + \rho(h_A - h_1)$$

$$P_1 = P_A + (55 \text{ lb/ft}^3)(1.17 \text{ ft}) = P_A + (64.35 \text{ lb/ft}^2)$$

$$P_1 = P_2 = P_A + (64.35 \text{ lb/ft}^2)$$

$$P_3 = P_2 - \rho(h_2 - h_3)$$

$$P_3 = P_A + (64.35 \text{ lb/ft}^2) - (62.4 \text{ lb/ft}^3)(0.67 \text{ ft})$$

$$P_3 = P_A + (22.54 \text{ lb/ft}^2)$$

$$P_B = P_3 - \rho(h_B - h_3)$$

$$P_B = P_A + (22.54 \text{ lb/ft}^2) - (55 \text{ lb/ft}^3)(2.5 \text{ ft})$$

$$P_B = P_A - 114.96 \text{ lb/ft}^2 \rightarrow P_A - P_B = 114.96 \text{ lb/ft}^2$$

$$V_A = \sqrt{\left(\frac{2g}{15} \right) \left(\frac{P_A - P_B}{\rho} + z_A - z_B \right)} = \sqrt{\left(\frac{2(32.2)}{15} \right) \left(\frac{114.96}{55} + (0 - 2) \right)}$$

$$V_A = 0.622 \text{ ft/s}$$

$$Q = V_A A = (0.622 \text{ ft/s}) \left(\frac{\pi (1.33)^2}{4} \right) = 0.0532 \text{ ft}^3/\text{s}$$