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DEPT: ELECT/ELECT

COURSE CODE/TITLE: ENG 214 | FLUID MECHANICS

1)  $V_1 = 5 \text{ms}^{-1}$   $V_2 = 2 \text{ms}^{-1}$   $L = 2.0 \text{m}$

$$h = \frac{0.35 \langle V_1 - V_2 \rangle^2}{2g}$$

$P_1$  in smaller head = 2.5m

$$P_2/w = P_1/w + \frac{\langle V_1^2 + V_2^2 \rangle}{2g} + \langle Z_1 - Z_2 \rangle h$$

$$= \frac{2.5 + 5^2 - 2^2}{2 \times 9.81} + 2 \cdot \frac{\langle 0.5(5-2)^2 \rangle}{2 \times 9.81}$$

$$= 2.5 + 1.07 + 2 - 0.16055$$

Pressure at lower head

$$= 5.409 \text{bar} \approx 5.41 \text{bar}$$

2) Inlet diameter = 200m

throat diameter = 100m

$$P_{10} = 17.658 \text{N/cm}^2$$

$$C_d = 0.98$$

$$\frac{\pi d^2}{4} = \frac{\pi \times 0.2^2}{4} = 0.0314 \text{m}^2$$

$$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.1^2}{4} = 7.85 \times 10^{-3} \text{m}^2$$

$$h = P_1/w - P_2/w$$

$$P_1/w = \frac{1.765 \times 10^{-2} \text{N/m}}{9.81}$$

$$= 1.7992 \times 10^{-3}$$

$$P_2/w = 0.3 \times 13.6 = 4.08$$

$$h = P_1/w = P_2/w = 1.7992 \times 10^{-3} - 4.08$$
$$= 4.098 \text{m}$$

$$Q = \frac{0.98 \times 0.314 \times 7.855 \times 10^{-3}}{\sqrt{(0.0314)^2 - 0.853 \times 10^{-3}}}$$
$$\times \sqrt{2 \times 9.81 \times 4.08^2}$$

$$Q = \frac{0.0002415 \times 8.749}{\sqrt{0.00092}}$$

$$Q = \frac{0.00216}{0.0303} = 0.0713 \text{m}^3/\text{s}$$

3.  $D_1 = 0.15 \text{m}$ ,  $D_2 = 0.3 \text{m}$ ,  $S.C = 0.9$ ,  $C.D = 0.64$

$$A_1 = \frac{\pi d^2}{4} = \frac{\pi \times 0.15^2}{4} =$$

$$A_2 = \frac{\pi d^2}{4} = \frac{\pi \times 0.3^2}{4}$$

$$h = 0.5 \left[ \frac{13.6}{0.9} - 1 \right]$$

$$Q = \frac{C_d A_1 A_2}{\sqrt{A_1^2 - A_2^2}} \times \sqrt{2gh}$$

$$= \frac{0.64 \times 0.0776 \times 0.07069}{\sqrt{(0.0776)^2 - (0.07069)^2}}$$

=

4)  $A \times 15 = 15 \text{m}$

170mm of mercury  $\langle 0.17 \text{m} \rangle$

Sg of mercury 13.6

Sg of Sea water = 1.026

$$h = 0.17 \left[ \frac{13.6}{1.026} - 1 \right]$$

$$h = 2.083 \text{m}$$

$$v = \sqrt{2gh} = \sqrt{2 \times 9.81 \times 2.085}$$

$$v = 6.39 \text{m/s} //$$