18/ENG07/002
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1. Diameter at inlet $D_1 = 0.3m$
Area inlet $A_1 = 0.07m^2$
Diameter at Throat $D_2 = 0.3m$
Area ~~at~~ Throat $A_2 = 0.01767m^2$
$y = 250mm = 0.25m$

The differential (h) is given by:

$$h = \left(\frac{P_1}{w} + z_1\right) - \left(\frac{P_2}{w} + z_2\right)$$

$$= y\left[\frac{S_{hg}}{S_f} - 1\right]$$

$$= 0.25\left[\frac{13.6}{0.9} - 1\right]$$

using the relation

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

$$= \frac{0.00121}{0.0677} \times 8.32$$

$$= 0.14890 m^3/s$$

1. Sol6

$$h = \left(\frac{P_1}{w} + z_1\right) - \left(\frac{P_2}{w} + z_2\right)$$

$$= 3.53$$

$$P_1 - P_2 = (9.81 \times 0.9) \times 5.85$$

$$= 55.8 \text{ kN/m}^3$$

2 $A_1 = \pi/4 = 0.01767 \text{ m}^2$

$A_2 = 0.00442 \text{ m}^2$

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

$$0.04 = 0.96 \times \frac{0.01767 \times 0.00442}{\sqrt{0.01767^2 - 0.00442^2}} \times \sqrt{2 \times 9.81 \times \sqrt{h}}$$

$$= 4.247 \text{ m}$$

$$4.247 = \left(\frac{P_1}{w} - \frac{P_2}{w}\right) + (z_1 + z_2)$$

$$= 0.15$$

$$(P_2 - P_1) = \rho g (4.247 + 0.15)$$

$$= 34.51 \text{ kN/m}^2$$