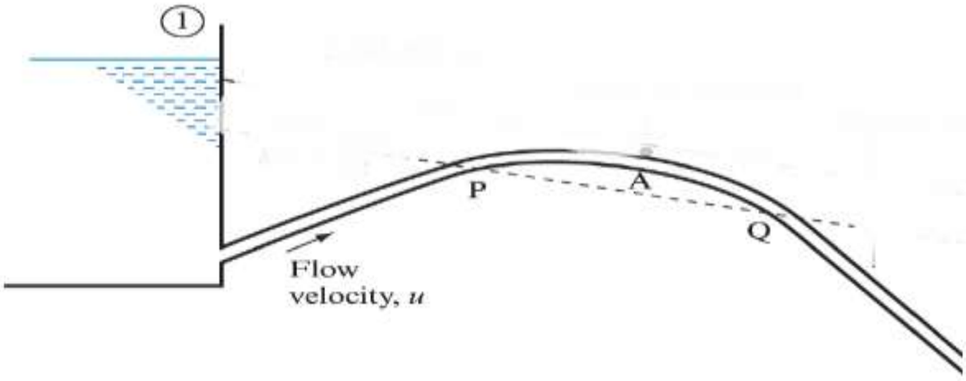
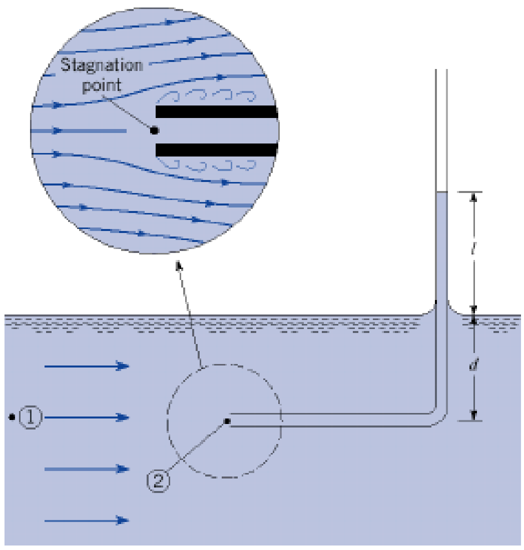
السؤال الاول

Draw Hydraulic Grade Line and Energy Grade Line ??



WHAT is a stagnation point and draw it ??

A point in a fluid stream where the velocity is reduced to zero is known as a *stagnation point.*



السؤال الثاني

☹لا اذكر

السؤال الثالث

3.64 The 6-cm-diameter 20°C water jet in Fig. P3.64 strikes a plate containing a hole of 4-cm diameter. Part of the jet passes through the hole, and part is deflected. Determine the horizontal force required to hold the plate.

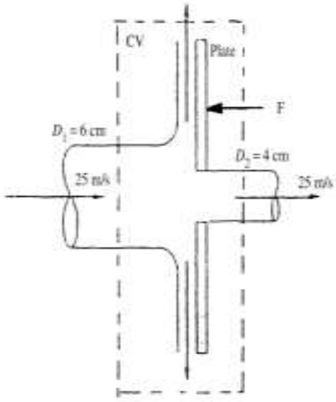


Fig. P3.64

Solution: First determine the incoming flow and the flow through the hole:

$$Q_{in} = \frac{\pi}{4}(0.06)^2(25) = 0.0707\ \frac{m^3}{s},\quad Q_{hole} = \frac{\pi}{4}(0.04)^2(25) = 0.0314\ \frac{m^2}{s}$$

Then, for a CV enclosing the plate and the two jets, the horizontal force balance is

$$\sum F_x = -F_{plate} = \dot{m}_{hole}u_{hole} + \dot{m}_{upper}u_{upper} + \dot{m}_{lower}u_{lower} - \dot{m}_{in}u_{in}$$

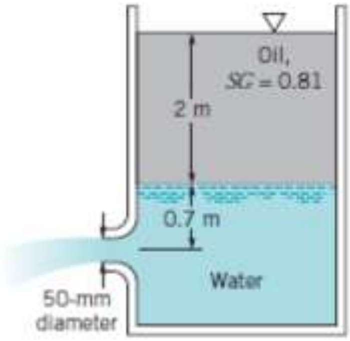
$$= (998)(0.0314)(25) + 0 + 0 - (998)(0.0707)(25)$$

$$= 784 - 1764,\quad \text{solve for } \mathbf{F \approx 980\ N\ (to\ left)}\quad \textit{Ans.}$$

السؤال الرابع

2- If viscous effects are neglected and the tank is large, determine the flowrate from the tank shown in the figure.

[0.0132 m^3s^{-1}]



الحل :

(2)

$$P_2 = P_1 + \gamma_o * 2 \quad (P_1 = 0)$$

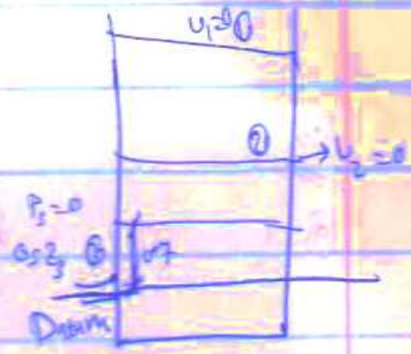
$$\frac{P_2}{\gamma_w} + \frac{u_2^2}{2g} + Z_2 = \frac{P_3}{\gamma_w} + \frac{u_3^2}{2g} + Z_3 \quad (u_2 = 0,\ P_3 = 0,\ Z_3 = 0)$$

$$\frac{\gamma_o * 2}{\gamma_w} + 0.7 = \frac{u_3^2}{2g}$$

$$u_3 = \sqrt{2g\left(\frac{\gamma_o * 2}{\gamma_w} + 0.7\right)}$$

$$Q = A_3 u_3 = \frac{\pi}{4}(0.05)^2\sqrt{2 * 9.81 * (0.81 * 2 + 0.7)}$$

$$= 0.0132\ m^3/s$$



السؤال الخامس (كانت فكرته زي واحد من السؤالين هدول)

2.128 The iceberg of Fig. 2.20 can be idealized as a cube of side length L as shown. If seawater is denoted as S = 1, the iceberg has S = 0.88. Is it stable?

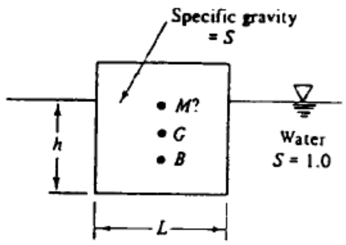


Fig. P2.128

Solution: The distance h is determined by

$\gamma_w h L^2 = S\gamma_w L^3$, or: $h = SL$

The center of gravity is at L/2 above the bottom, and B is at h/2 above the bottom. The metacenter position is determined by Eq. (2.52):

$$MB = I_o/\upsilon_{sub} = \frac{L^4/12}{L^2 h} = \frac{L^2}{12\,h} = \frac{L}{12S} = MG + GB$$

Noting that GB = L/2 - h/2 = L(1-S)/2, we may solve for the metacentric height:

$$MG = \frac{L}{12S} - \frac{L}{2}(1-S) = 0 \quad \text{if} \quad S^2 - S + \frac{1}{6} = 0\ , \ \text{or:}\quad S = 0.211 \ \text{or}\ 0.789$$

Instability: 0.211<S<0.789. Since the iceberg has S = 0.88 > 0.789, **it is stable.** *Ans.*

or

CHAPTER 6

▮ See Fig. 6-40.

$$h_G = h/2 \qquad h_B = h_1/2 \qquad F_b = W \qquad \gamma(h_1\pi r_0^2) = [(\text{s.g.})(\gamma)](h\pi r_0^2) \qquad h_1 = (\text{s.g.})(h)$$

$$h_B = (\text{s.g.})(h)/2 \qquad MG = MB - GB$$

$$\overline{MB} = I/V_d = (\pi r_0^4/4)/(h_1\pi r_0^2) = r_0^2/(4h_1) = r_0^2/[(4)(\text{s.g.})(h)]$$

$$GB = h_G - h_B = h/2 - (\text{s.g.})(h)/2 = (h)(1-\text{s.g.})/2 \qquad MG = r_0^2[(4)(\text{s.g.})(h)] - (h)(1-\text{s.g.})/2$$

For stable equilibrium, $MG \ge 0$, in which case $r_0^2/[(4)(\text{s.g.})(h)] \ge (h)(1-\text{s.g.})/2$, $r_0/h \ge \sqrt{(2)(\text{s.g.})(1-\text{s.g.})}$.

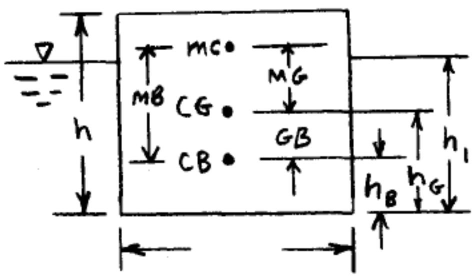


Fig. 6-40