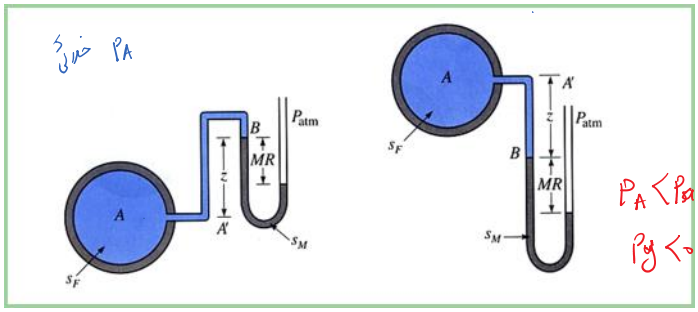
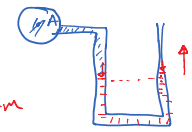
Meeting_012

Tuesday, November 17, 2020 2:01 PM

$P_g + P_{atm} = P_{abs}$



$P_A = P_{atm}$

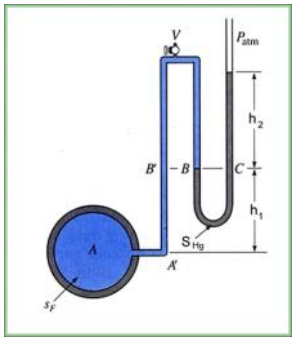


$P_A < P_{atm}$

$P_g < 0$

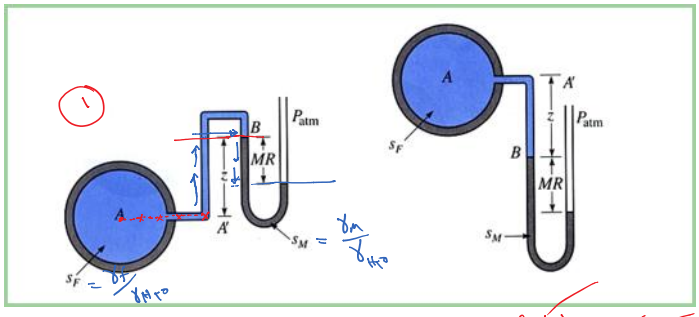
$(P_A)_{abs} = P_{atm}$

$(P_g)_A = 0$



$P_A > P_{atm}$

$P_g > 0$



فشار نقطه A چه قدر است؟

$\left(\frac{P_A}{\gamma_{H_2O}}\right)_g - z \cdot S_f + MR \cdot S_M = 0$

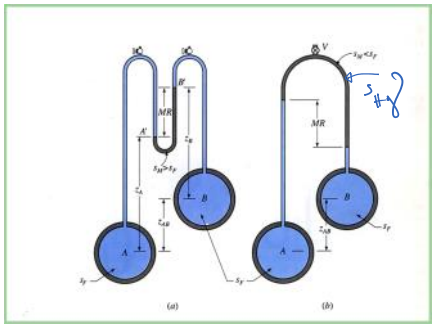
$\left(\frac{P_A}{\gamma_{H_2O}}\right)_g = z \cdot S_f - MR \cdot S_M$

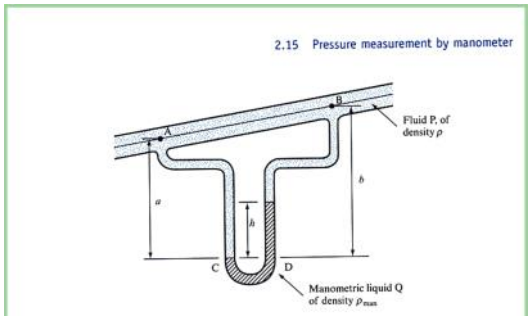
فشار نسبی

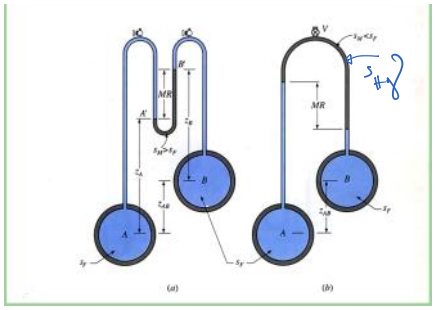
$\left(\frac{P_A}{\gamma_{H_2O}}\right)_{abs} = \left(\frac{P_A}{\gamma_{H_2O}}\right)_g + \frac{P_{atm}}{\gamma_{H_2O}}$

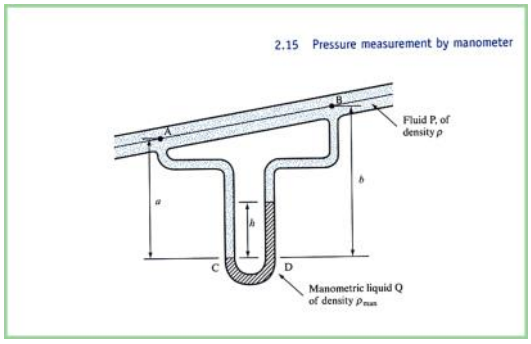
فشار مطلق

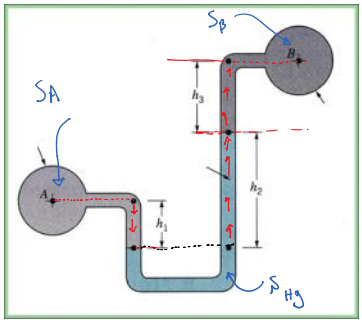
مانومتر تفاضلی: اختلاف فشار بین دو نقطه را اندازه گیری می کند.





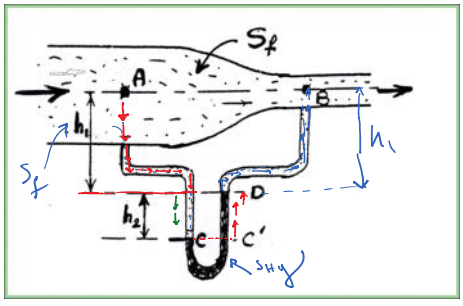






$$\frac{P_A}{\gamma_{H_2O}} + h_1 S_A - h_2 S_{Hg} - h_3 S_B = P_B/\gamma_{H_2O}$$

$$\Rightarrow \boxed{\frac{P_A - P_B}{\gamma_{H_2O}} = h_2 S_{Hg} + h_3 S_B - h_1 S_A}$$



دبی سنج

$$\frac{P_A}{\gamma_{H_2O}} + h_1 S_f + h_2 S_f - h_2 S_{Hg} - h_1 S_f = P_B/\gamma_{H_2O}$$

$$\frac{P_A - P_B}{\gamma_{H_2O}} = h_2 (S_{Hg} - S_f) \quad (m)$$

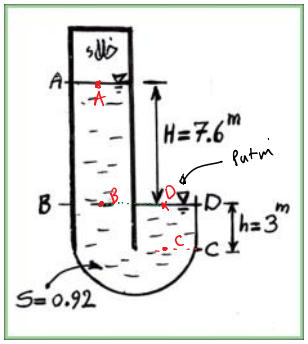
اختلاف فشار بین A و B برحسب ارتفاع آب

اختلاف فشار بین A و B برحسب kPa $\rightarrow$ $P_A - P_B = \left[h_2 (S_{Hg} - S_f)\right] \cdot \gamma_{H_2O}$

اختلاف فشار بین A و B را برحسب ارتفاع بنزین ($\gamma_{بنزین}$) بدست آورید

$$\frac{P_A - P_B}{\gamma_{بنزین}} = \left[h_2 (S_{Hg} - S_f)\right] \frac{\gamma_{H_2O}}{\gamma_{بنزین}}$$

مثال: در شکل زیر فشار نقاط A، B، C و D



برای بدکسید

$(P_D)_g = 0$ $\quad (P_B)_g = (P_D)_g = 0$

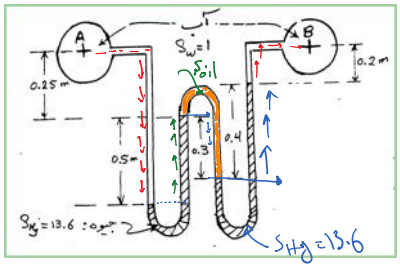
$\left(\frac{P_D}{\gamma_{H_2O}}\right)_g + 3 \times S = \left(\frac{P_C}{\gamma_{H_2O}}\right)_g$

$0 + 3 \times 0.92 = \left(\frac{P_C}{\gamma_{H_2O}}\right)_g \rightarrow \left(\frac{P_C}{\gamma_{H_2O}}\right)_g = 2.76$ m

$\left(\frac{P_B}{\gamma_{H_2O}}\right)_g - 1.4 \times 0.92 = \left(\frac{P_A}{\gamma_{H_2O}}\right)_g \rightarrow$

$0 - 1.4 \times 0.92 = \frac{P_A}{\gamma_{H_2O}} \rightarrow \left(\frac{P_A}{\gamma_{H_2O}}\right)_g = -6.99$ m

$\Rightarrow (P_A)_g = -6.99 \times 10 = -49.9$ kPa



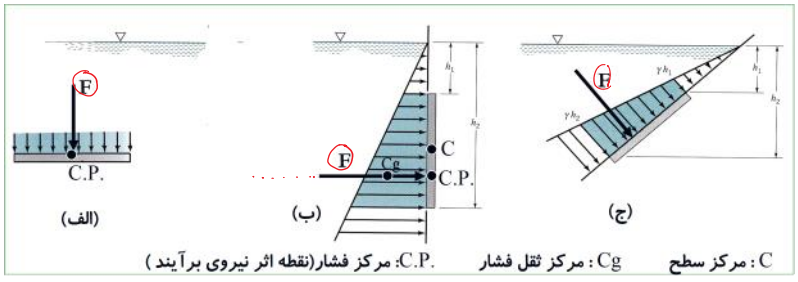
$\frac{P_A}{\gamma_{H_2O}} + (0.25 + 0.5) S_w - 0.5 S_{Hg} + 0.3 \times S_{oil}$

$- S_{Hg} \times 0.4 - 0.2 S_w = P_B / \gamma_{H_2O}$

$S_{oil} = 0.8$

$\tau = 0$ $\quad P$

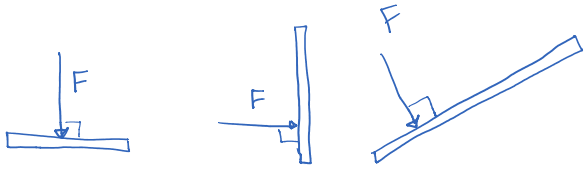
سطوح صاف



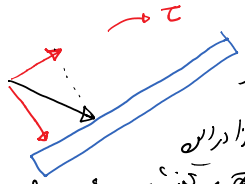
(۱) مقدار نیروی وارد شده به سطوح صاف (F=؟)

(۲) نقطه اثر نیرو (مرکز فشار) C.P

در سیال ساکن $\tau = 0$ بوده؛ صراحتاً و فقط تنش عمودی (نرمال) وجود دارد که به صورت فشار خلاصه می‌شود.

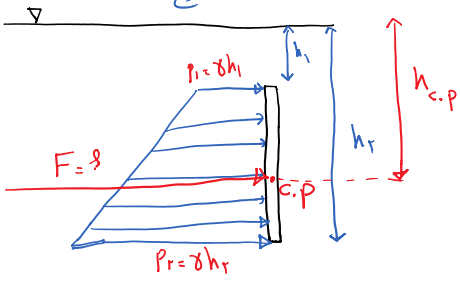


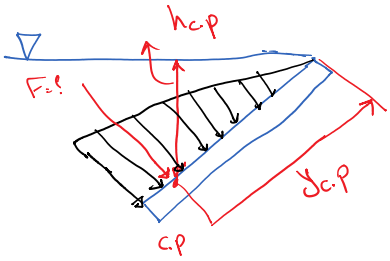
* نیروهای وارده بر سطوح صاف همیشه عمود بر آن سطوح هستند

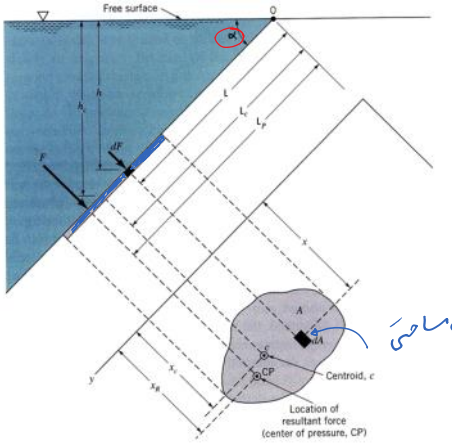


اگر نیرو عمود بر سطح باشد
یک سوم نیروی صورت با سطح مواجه است. لذا در این
حالت τ برای ایجاد لغزش و کنش برشی باعث جریان یافتن سیال می‌شود

* نیروهای وارده بر سطوح مستطیل یا کنید فشارهای وارده بر سطوح هستند



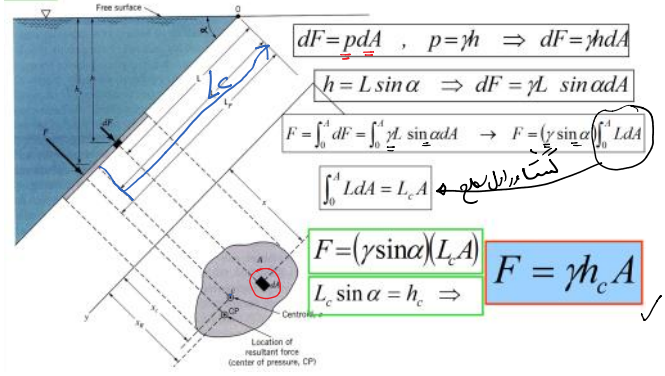




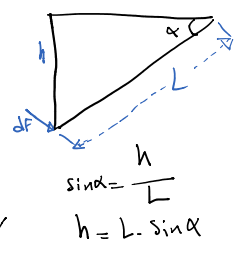
$$h = L\sin\alpha$$

اکان ساحتی

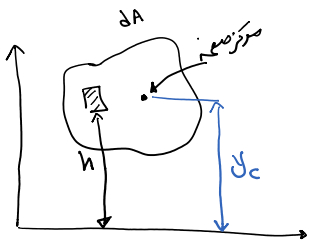
1. محاسبه مقدار نیرو



$P \cdot A = F$
$P = \gamma h$

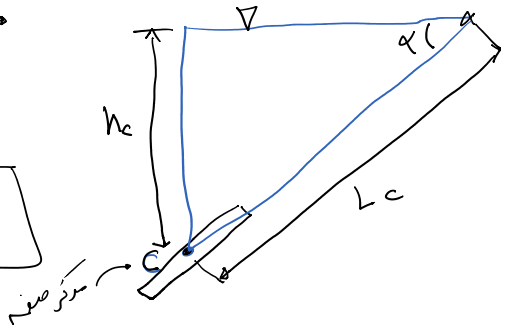


قسمت اول سطح



$$dM = h \cdot dA \rightarrow M = \int h\,dA = A \cdot y_c$$

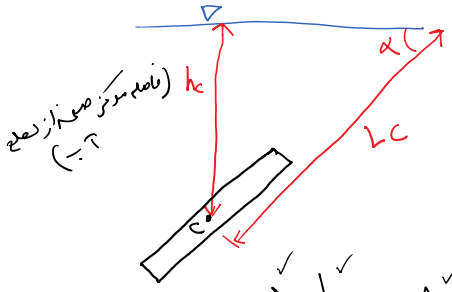
فاصله مرکز صفحه از محور x‌ها

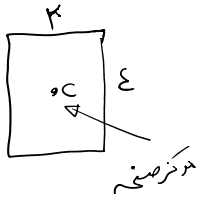


$$\sin\alpha = \frac{h_c}{L_c}$$

$$\Rightarrow \boxed{h_c = L_c \cdot \sin\alpha}$$

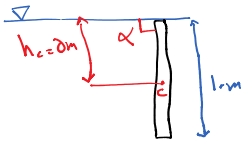
برای کاهش نیروی وارده بر سطوح مستطیل از رابطه زیر استفاده می‌شود



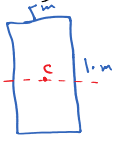


$$* \begin{cases} F = \gamma \cdot h_c \cdot A \\ h_c = L_c \cdot \sin\alpha \end{cases}$$

مثال: در شکل های زیر مقدار نیروی وارد شده بر صفحه را به دست آورید؟



$b = 2m$
$h = 10m$

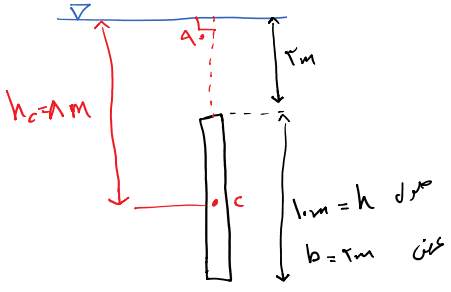


$\alpha = 90°$

$$F = \gamma \cdot h_c \cdot A$$

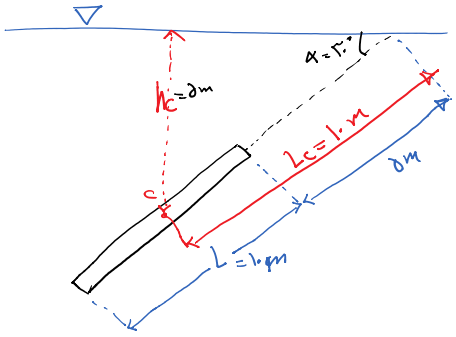
$$= 10 \cdot 5 \times 2 \times 10 \cdot kN$$

$$h_c = L_c \cdot \underbrace{\sin\alpha}_{\sin 90 = 1} \Rightarrow \boxed{h_c = L_c}$$



$$F = \gamma h_c \cdot A = 10 \times 8 \times 10 \times 2\ N$$

$\alpha = 90 \rightarrow \underline{h_c = L_c}$



$L = 10$ $b = 2m$

$h_c = L_c \cdot \sin\alpha$

$= 10 \times \sin 30 = 5m$

$F = \gamma \cdot A \cdot h_c$

$= 10 \times (1 \times 2) \cdot 5 =$