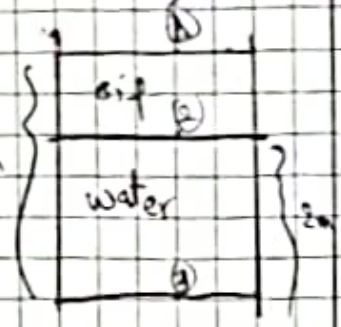
Ex1 :



EAS between (3) and (2)

$P_3 = P_2 + \rho_{water} g$ — (1)

EAS between (2) and (A)

$P_2 = P_A + \rho_{air} g$ — (2)

(2) dans (1) $P_3 = P_A + \rho_{air} g + \rho_{water} g$

N.A : $P_3 = 10^5 + (930 \times 9.81) + 2(1000 \times 9.81)$

$\boxed{P_3 = 1.28 \times 10^5 \text{ Pa}}$

Ex2 :

EAS entre (3) et (2)

$P_2 = P_3 + 0.15 \rho_{Hg} g$ (1)

EAS entre (2) et (1)

$P_2 = P_A + 0.728 \rho_{eau} g$ (2)

(1) = (2)

$P_3 + 0.15 \rho_{Hg} g = P_A + 0.728 \rho_{eau} g$

$P_3 = P_A + 0.728 \rho_{eau} g - 0.15 \rho_{Hg} g$

N.A :

$P_3 = 10^5 + 0.728 \times 700 \times 9.81 - 0.15 \times 13600 \times 9.81$

$\boxed{P_3 = 1.07 \times 10^5 \text{ Pa}}$

Ex3 :

$P_A = \frac{F_{Pist}}{S} = \frac{4 F_{Pist}}{\pi d_1^2}$

N.A : $P_A = \frac{4 \times 150}{\pi \times (10 \times 10^{-3})^2}$ $\boxed{P_A = 1.9 \times 10^6 \text{ Pa}}$

$P_A = P_B \rightarrow Z_A = Z_B$

$F_{Eau} = P_B S = P_B \frac{\pi d_2^2}{4}$

N.A : $F_{Eau} = 1.9 \times 10^6 \times \pi \times \frac{(100 \times 10^{-3})^2}{4}$

$\boxed{F_{Eau} = 14922.56 \text{ N}}$

Ex4 :

$\sum \vec{F}_{ext} = \vec{0}$

1) $\vec{T} + \vec{P} + \vec{F_A} = \vec{0}$ $P - T - F_A = 0$

PRINCIPE $T = P - F_A$

$P = mg = \rho_s V_s g$

$F_A = F_{A1} + F_{A2} = \rho_w \frac{V_s}{2} g + \rho_{oil} \frac{V_s}{2} g$

$T = \rho_s V_s g - \left[\rho_w \frac{V_s}{2} g + \rho_{oil} \frac{V_s}{2} g\right]$

N.A :

$T = 2640 \times 0.15^3 \times 9.81 - \left[800 \times \frac{0.15^3}{2} \times 9.81 + 1000 \times \frac{0.15^2}{2} \times 9.81\right]$

$\boxed{T = 57.6 \text{ N}}$

2) $P = F_A$

$\rho_s V_s g = \rho_m V_{immersed} g$

$\frac{V_{im}}{V_s} = \frac{\rho_s}{\rho_m} = \frac{d_s}{d_w} = \frac{7.25}{13.6} = 0.53$

$= 53\%$

Ex5 :

EHS : (1) et (A)

$P_A = P_1 + h_1 \rho_e g$

EHS : (A) et (B)

$P_B = P_A + 0,2\, \rho_{eau} g$

EHS (B) et (2)

$P_2 = P_B - 0,35\, \rho_{Hg} g$

$\Rightarrow P_B = P_2 + 0,35\, \rho_{Hg} g$

$P_A = P_B - 0,2\, \rho_{eau} g$

$P_A + 0,1\, \rho_e g = P_2 + 0,35\, \rho_{Hg} g - 0,2\, \rho_{eau} g$

$P_A = P_2 + 0,35\, \rho_{Hg} g - 0,2\, \rho_{eau} g - 0,1\, \rho_e g$

A.N :

$P_A = 85,6 \times 10^3 + (0,35 \cdot 13600 \cdot 9,81) - (0,2 \times 850 \times 9,81) - (0,1 \times 1000 \times 9,81)$

$P_A = 1,3 \times 10^5\ Pa = 1,3\ bar$

Ex6 :

EHS (C) et (E)

$P_E = P_C + 0,25\, \rho g$

$P_C = P_{1,5} + P_{\text{piston}} = \frac{F}{S} = \frac{4w}{\pi d^2}$

$P_E = \frac{4w}{\pi d^2} + 0,25\, \rho g$

A.N $P_E = \frac{4 \times 25}{\pi (0,3)^2} + 0,25 \times 1000 \times 9,81$

$P_E = 2,8 \times 10^5\ Pa$

EHS : (D) et (C)

$P_D = P_C + 0,25\, \rho_e g$

$P_D = \frac{4w}{\pi d^2} + 0,25\, \rho_e g$

A.N : $P_D = \frac{4 \times 25}{\pi \times (0,3)^2} + 0,25 \times 1000 \times 9,81$

$P_D = 2,09 \times 10^5\ Pa$

Ex7 :

EHS (A) et (1)

$P_A = P_1 + 0,05\, \rho_e g$

EHS (1) et (2)

$P_2 = P_A - 0,07\, \rho_{Hg} g$

EHS (3) et (B)

$P_2 = P_B + 0,06\, \rho_{eau} g$

$P_A - 0,07\, \rho_{Hg} g = P_B + 0,06\, \rho_{eau} g$

$P_A + 0,05\, \rho_e g - 0,07\, \rho_{Hg} g = P_B + 0,06\, \rho_{eau} g$

$P_A = P_B + 0,06\, \rho_{eau} g + 0,07\, \rho_{Hg} g - 0,05\, \rho_e g$

A.N : $P_A = 87 \times 10^3 + (0,06 \times 870 \times 9,81) + (0,07 \times 13600 \times 0,5) - (0,05 \times 1000 \times 9,81)$

$P_A = 9,5 \times 10^5\ Pa$

Ex8 :

EHS (1) et (2)

$P_2 = P_1 - \rho g x$

$x = \frac{P_1 - P_2}{\rho g}$

EHS (3) et (4)

$P_2 = P_3 = P_4 - 0,1\, \rho g$

$x = \frac{P_1 - (P_4 - 0,1\, \rho_{Hg} g)}{\rho g}$

A.N :

$x = \frac{2 \times 10^5 - (10^5 - 0,1 \times 13600 \times 9,81)}{1000 \times 9,81}$

$x = 0,85\ m$

Ex 9 :

1 EAS : (B) et (2)

$P_B = P_A + \rho g \Delta h_1$

$\Delta h_1 = \frac{P_B - P_A}{\rho g}$

EHS = (2) et (3)

$P_3 = P_2 + \rho g \Delta h_2$

$\Delta h_2 = \frac{P_3 - P_2}{\rho g}$

$P_A = \frac{F_A}{A_A} = \frac{1100}{0,04} = 27500\ Pa$

$P_2 = \frac{F_2}{A_2} = \frac{600}{0,02} = 30000\ Pa$

$P_3 = \frac{F_3}{A_3} = \frac{1000}{0,03} = 33333,33\ Pa$

$\Delta h_1 = \frac{30000 - 27500}{1000 \times 9,81} = 0,27\ m$

$\Delta h_2 = \frac{33333,33 - 30000}{1000 \times 9,81} = 0,34\ m$

Ex 10 :

EAS (C) et (D)

$P_C = P_D + \rho g (Z_D - Z_C)$

$Z_D = \frac{P_C - P_D}{\rho g} + Z_C$

EHS (B) et (C)

$P_C = P_B + 5 \rho_f g$

EHS (B) et (A)

$P_B = P_A + 6 \rho_{eau} g$

$P_C = P_A + 6 \rho_{eau} g + 5 \rho_f g$

$Z_D = \frac{P_A + 6 \rho_{eau} g + 5 \rho_f g - P_D}{\rho g}$ atmosphérique

AN : $Z_D = \frac{6 \times 850 \times 9,81 + 5 \times 1000 \times 9,81}{1000 \times 9,81}$

$Z_D = 10,1\ m$

Fiche TD N°04