Faculté des sciences Exactes

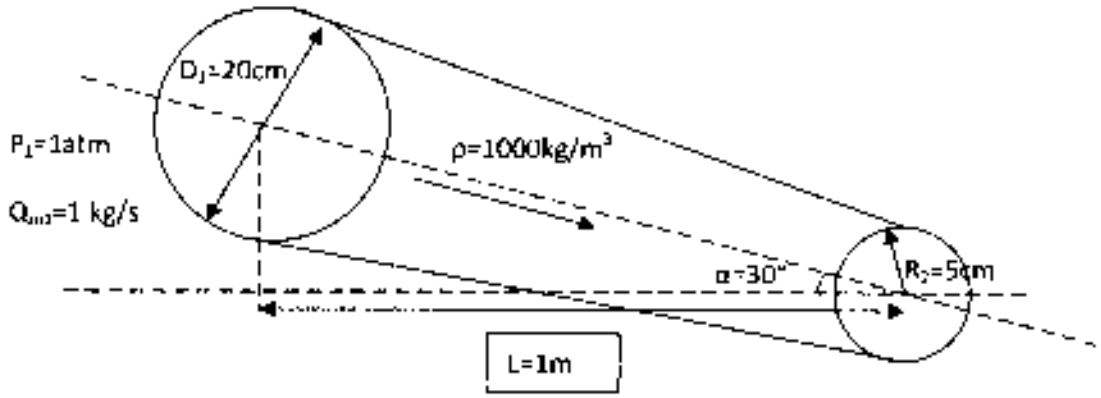
Département de Physique

2éme Année licence physique

Examen final : Mécanique des fluides

Exercice 1: (10 pts)

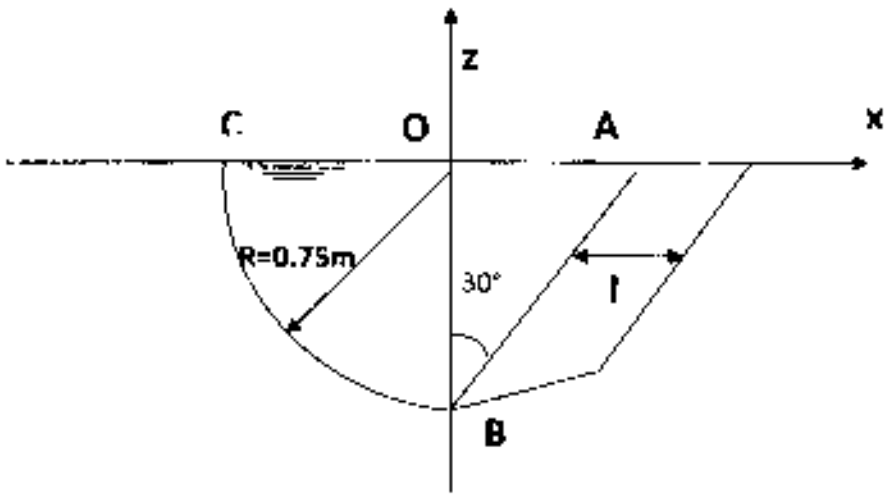
- Calculer P2, V1 et V2? On donne g=10m/s^2.



Exercice 02: (10 pts)

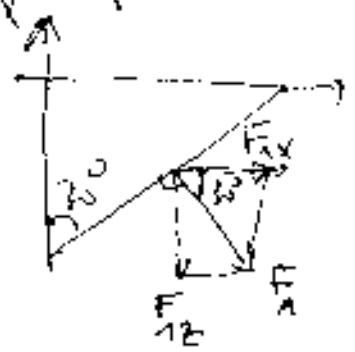
Soit le réservoir ABC de longueur l=5m contient de l'eau ρ=1000kg /m^3. On donne g=10m/s^2

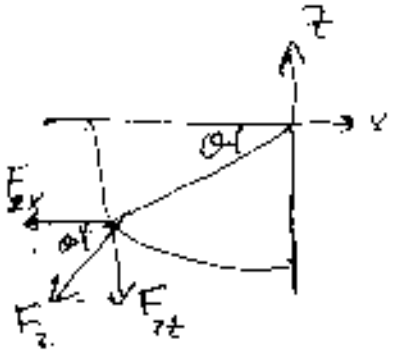
- Calculer l'action de l'eau F_1 sur la surface AB.
- Calculer l'action de l'eau F2 sur la surface BC.
  Calculer l'action totale de l'eau sur le réservoir ABC.



Bon courage

Exo 2 : /10 pts !





$$F_1 = \begin{cases} F_{1x} = \dfrac{\rho g R^2 \ell}{\sqrt{3}} \cos 30 = \dfrac{\rho g R^2 \ell}{2} = 1{,}41 \times 10^4\ \text{N} & (1) \\ F_{1z} = -\dfrac{\rho g R^2 \ell}{\sqrt{3}} \sin 30 = -\dfrac{\rho g R^2 \ell}{2\sqrt{3}} = 0{,}82 \times 10^4\ \text{N} & (1) \end{cases}$$

$$F_1 = \sqrt{F_{1x}^2 + F_{1z}^2} = \underline{1{,}61 \times 10^4\ \text{N}} \quad (2)$$

$$F_2 = \begin{cases} F_{2x} = -\dfrac{\rho g R^2 \ell}{2} = 1{,}41 \times 10^4\ \text{N} & (1) \\ F_{2z} = -\dfrac{\rho g R^2 \ell \pi}{4} = 2{,}21 \times 10^4\ \text{N} & (1) \end{cases}$$

$$F_2 = \sqrt{F_{2x}^2 + F_{2z}^2} = \underline{2{,}6 \times 10^4\ \text{N}} \quad (2)$$

$$F_T = \sqrt{(F_{1x} + F_{2x})^2 + (F_{1z} + F_{2z})^2} = \underline{30208\ \text{N}} \quad (2)$$

Corrigé Type
MDF_L2

Exo 1 : (10 pts)

- $P_1 + \frac{\rho}{2} v_1^2 + \rho g z_1 = P_2 + \frac{\rho}{2} v_2^2 + \rho g z_2$ — (1) (1)

$P_2 = ?$

(1) $\Rightarrow P_2 = P_1 + \frac{\rho}{2}(v_1^2 - v_2^2) + \rho g (z_1 - z_2)$ — (2)

$\rho_{m_1} = \rho_{m_2} = \rho V_1 S_1 = \rho V_2 S_2 \Rightarrow V_1 = \frac{\rho_{m_1}}{\rho S_1}$; $V_2 = \frac{\rho_m}{\rho S_2}$ (1)

(2) $\Rightarrow P_2 = P_1 + \frac{\rho}{2}\left(\left(\frac{\rho_m}{\rho S_1}\right)^2 - \left(\frac{\rho_m}{\rho S_2}\right)^2\right) + \rho g (z_1 - z_2)$ — (3)

$z_1 - z_2 = L \operatorname{tg} 30$

(3) $\Rightarrow P_2 = P_1 + \frac{\rho \rho_m^2}{2\rho^2}\left[\frac{1}{S_1^2} - \frac{1}{S_2^2}\right] + \rho g L \operatorname{tg} 30$

$\Rightarrow P_2 = P_1 + \frac{\rho_m^2}{2\rho}\left[\frac{1}{S_1^2} - \frac{1}{S_2^2}\right] + \rho g L \operatorname{tg} 30$ (1)

$P_1 = 1 \text{ atm} = 10^5 [Pa]$; $\rho_m = 1 \text{ Kg/s}$; $\rho = 10^3 \text{ Kg/m}^3$, $g = 10 \text{ m/s}^2$

$L = 1 \text{ m}$, $\operatorname{tg} 30 = 0{,}577$; $S_1 = 0{,}0314 \text{ m}^2$, $S_2 = 0{,}0078 \text{ m}^2$.

$\boxed{P_2 = 1{,}11 \text{ atm}}$ (2)

- $V_1 = \frac{\rho_m}{\rho S_1} = 0{,}031 \text{ m/s}$ (2)
- $V_2 = \frac{\rho_m}{\rho S_2} = 0{,}128 \text{ m/s}$ (2)