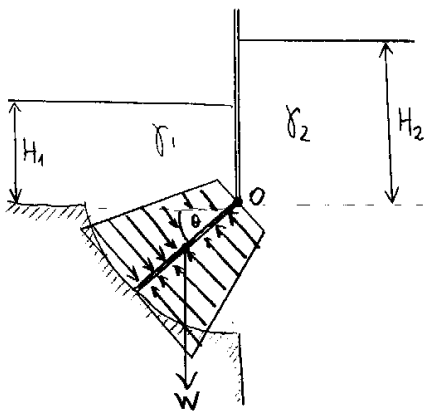
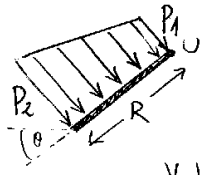
P2)



Existen 3 fuerzas involucradas:
- fuerza de presión líquido γ_1
- fuerza de presión líquido γ_2
- peso compuerta

i) Fuerza presión líquido γ_1



$$P_1 = \gamma_1 H_1$$

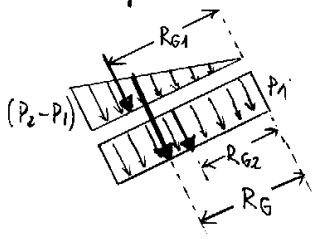
$$P_2 = \gamma_1 (H_1 + R \operatorname{sen}\theta)$$

Volumen prisma presiones: $\frac{(P_1+P_2)}{2} \cdot R \cdot b$

Fuerza = Volumen prisma $= \gamma_1 \left(\frac{H_1 + H_1 + R\operatorname{sen}\theta}{2}\right) \cdot R \cdot b$

$$\boxed{F_1 = \gamma_1 \left[H_1 + \frac{R}{2}\operatorname{sen}\theta\right] \cdot R \cdot b}$$

Centro de presiones (pto. de aplicación de la fuerza) coincide con centro de gravedad de prisma de presiones. Se descompone en dos



$$R_{G1} = \frac{2}{3}R \qquad R_{G2} = \frac{R}{2}$$

Volumen prisma 1 $= \frac{(P_2-P_1)}{2} \cdot R \cdot b = \frac{\gamma_1 R \operatorname{sen}\theta}{2} \cdot R \cdot b$

Volumen prisma 2 $= P_1 \cdot R \cdot b = \gamma_1 H_1 R b$

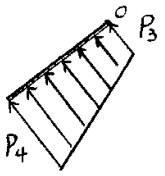
$$R_G^1 = \frac{\sum R_{Gi} \forall_i}{\forall} = \frac{\frac{2}{3}R \cdot \frac{\gamma_1 R \operatorname{sen}\theta}{2} \cdot R \cdot b + \frac{R}{2}\gamma_1 H_1 R b}{\gamma_1 \left[H_1 + \frac{R}{2}\operatorname{sen}\theta\right] \cdot R \cdot b}$$

$$\boxed{R_G^1 = \frac{\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_1}{H_1 + \frac{R}{2}\operatorname{sen}\theta}}$$

ii) Fuerza Presión líquido γ_2

$$P_3 = \gamma_2 H_2$$

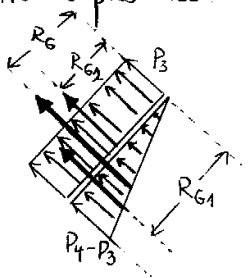
$$P_4 = \gamma_2 (H_2 + R \operatorname{sen}\theta)$$



Análogamente al caso i

$$\boxed{F_2 = \gamma_2 \left[H_2 + \frac{R}{2}\operatorname{sen}\theta\right] \cdot R \cdot b}$$

Centro de presiones



$$R_{G1} = \frac{2}{3}R \qquad R_{G2} = \frac{R}{2}$$

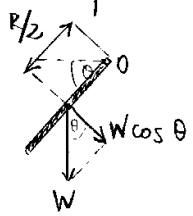
$$\text{Volumen prisma 1} = \frac{(P_4 - P_3)}{2} \cdot R \cdot b = \frac{\gamma_2 R \operatorname{sen}\theta}{2} \cdot R \cdot b$$

$$\text{Volumen prisma 2} = P_3 \cdot R \cdot b = \gamma_2 H_2 R b$$

Análogamente al caso i:

$$R_G^2 = \frac{\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_2}{H_2 + \frac{R}{2}\operatorname{sen}\theta}$$

iii) Peso compuerta



$$F_3 = W$$

$$R_G = R/2$$

Momentos (respecto a O)

$$\sum M_o = 0$$

$$W\cos\theta \cdot \frac{R}{2} + F_1 R_G^1 - F_2 R_G^2 = 0$$

$$W\cos\theta \cdot \frac{R}{2} + \gamma_1 \left[H_1 + \frac{R}{2}\operatorname{sen}\theta\right] \cdot Rb \cdot \left(\frac{\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_1}{H_1 + \frac{R}{2}\operatorname{sen}\theta}\right) - \gamma_2 \left[H_2 + \frac{R}{2}\operatorname{sen}\theta\right] \cdot Rb \left(\frac{\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_2}{H_2 + \frac{R}{2}\operatorname{sen}\theta}\right) = 0$$

$$W\cos\theta \cdot \frac{R}{2} + \gamma_1 Rb\left(\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_1\right) - \gamma_2 Rb\left(\frac{R^2}{3}\operatorname{sen}\theta + \frac{R}{2}H_2\right) = 0$$

$$\boxed{\frac{W}{2}\cos\theta + (\gamma_1 - \gamma_2) b \frac{R^2}{3}\operatorname{sen}\theta + (\gamma_1 H_1 - \gamma_2 H_2) b \frac{R}{2} = 0}$$