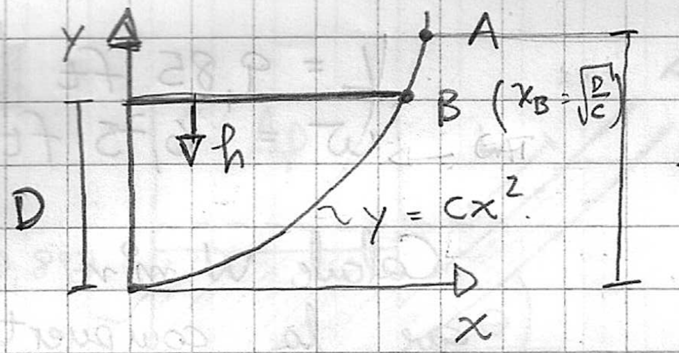
P_{361}



$C = 0{,}25 \ m^{-1}$
$D = 2m$
$H = 3m$
Ancho $b = 2m$

- Calcule $\overline{F_V}$ y su línea de acción.
- Calcule F_H y su línea de acción

$$\overline{F_V} = \int P \cdot dA_y = \int \gamma_{H_2O} (D - y) \ b \cdot dx$$

$$\overline{F_V} = \gamma_{H_2O} \, b \int (D - cx^2) dx$$

$$\overline{F_V} = \gamma_{H_2O} \cdot b \left(Dx - \frac{cx^3}{3} \right) \Big|_0^{\sqrt{D/C}}$$

$$\overline{F_V} = \gamma_{H_2O} \cdot b \cdot \left(\frac{D^{3/2}}{C^{1/2}} - \frac{C}{3} \left(\frac{D}{C} \right)^{3/2} \right)$$

$$\overline{F_V} = \gamma_{H_2O} \cdot b \, \frac{2}{3} \, \frac{D^{3/2}}{C^{1/2}} = 73{,}9 \ kN$$

Cálculo de la línea de acción: x'

$$|F_V| x' = \int x \cdot P \cdot dA_y$$

$$x' = \frac{1}{|F_V|} \int x \, \gamma_{H_2O} (D - y) \, b \, dx$$

$$x' = \frac{1}{|F_V|} \cdot \gamma_{H_2O} \, b \int (D - cx^2) \, x \, dx$$

$$x' = \frac{1}{F_V} \gamma_{H_2O} \cdot b \left(D\frac{x^2}{2} - c\frac{x^4}{4} \right) \Big|_0^{\sqrt{D/C}}$$

$$x' = \frac{1}{F_V} \cdot b \cdot \gamma \cdot \frac{D^2}{4c}$$

$$\boxed{x' = 1{,}06 \text{ m}}$$

Ahora la fuerza horizontal:

$$F_H = \int P\,dA_x = \int \gamma_{H_2O} \cdot (D-y) \cdot b \cdot dy$$

$$= \gamma_{H_2O} \cdot b \left(Dy - \frac{y^2}{2} \right) \Big|_0^D$$

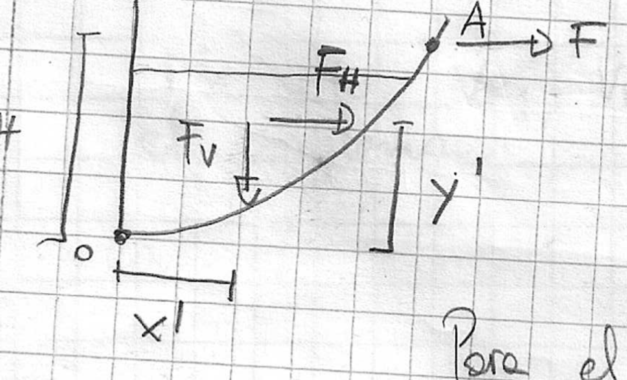
$$= \gamma_{H_2O} \cdot b \cdot \frac{D^2}{2} = 39{,}2 \text{ kN}$$

$$y' = \frac{1}{|F_H|} \int y \cdot P \cdot dA_x = \frac{1}{|F_H|} \int y\, \gamma_{H_2O} (D-y)\, b\, dy$$

$$y' = \frac{\gamma_{H_2O} \cdot b}{|F_H|} \left(D\frac{y^2}{2} - \frac{y^3}{3} \right) \Big|_0^D$$

$$y' = \frac{\gamma_{H_2O} \cdot b}{|F_H|} \left(\frac{D^3}{6} \right) = 0{,}67 \text{ m}$$

Cual es la fuerza horizontal necesaria en A p/equilibrio?



$$F \cdot H = F_H \cdot y' + F_V \cdot x'$$

$$F = 34{,}87 \text{ kN}$$

Para el caso vertical, $F = 30{,}19$ kN