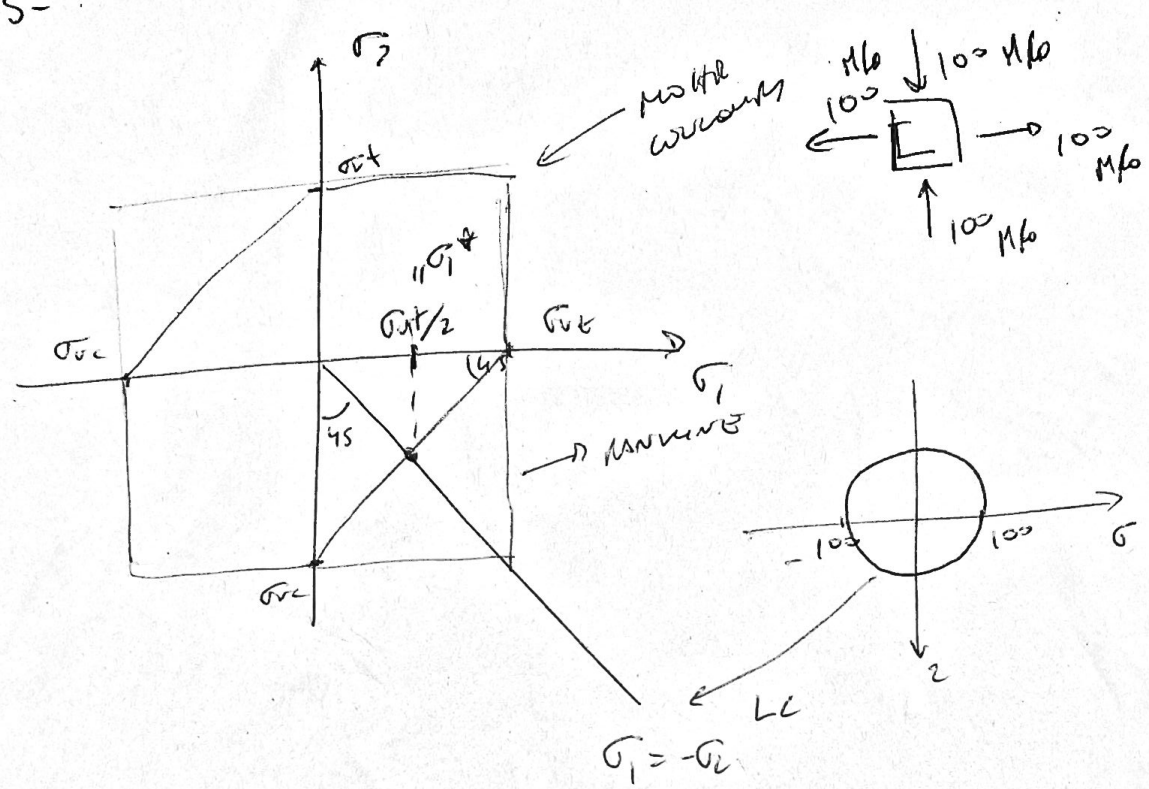
3-



FS RANKINE

$$FS = \frac{\sigma_{ut}}{\sigma_1} = 4$$

,

$$FS = \left| \frac{\sigma_{uc}}{\sigma_2} \right| = 4$$

FS MOHR COULOMB

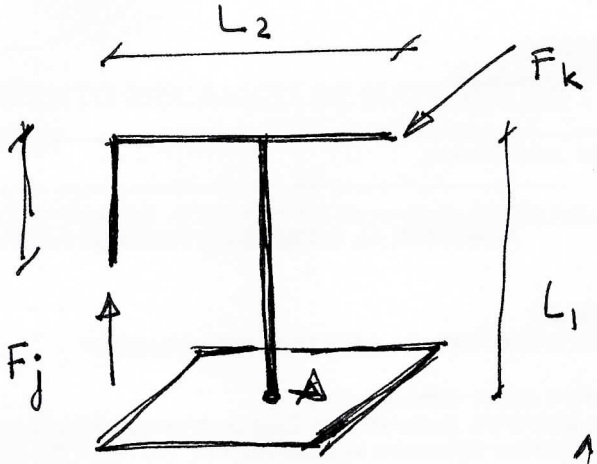
$$FS = \frac{\sigma_1^*}{\sigma_1} \qquad \sigma_1^* = \sigma_{ut}/2 = 200 Mpa \rightarrow \boxed{FS = 2}$$

$L_1 = 1m$

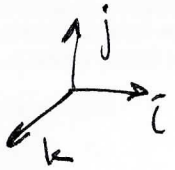
$L_2 = 2m$

$d = 5cm$

$F_k = F_j = 1kN.$



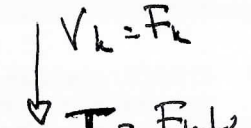
ϕd



En A:

DIRECTA: F_j (TRACCIÓN)

TORSIÓN: $F_k \frac{L_2}{2} (-\hat{j})$



CORTANTE $\hat{k}$, FLECTOR $\hat{i}$

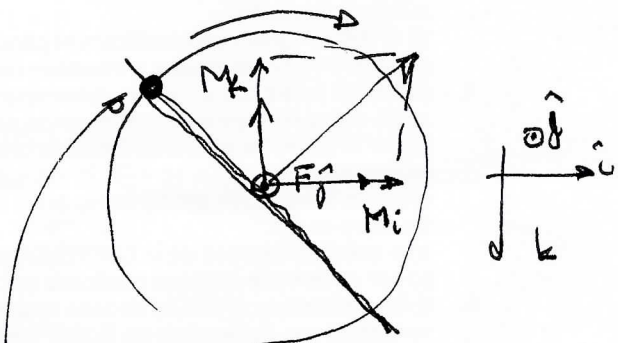
$V_k = F_k \hat{k}$; $M_{\hat{i}} = F_k \cdot L_1 \hat{i}$

FLECTOR $\hat{k}$

$M_{\hat{k}} = -F_j \frac{L_2}{2} \hat{k}$

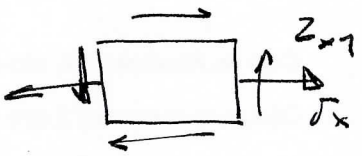
$M = \sqrt{M_i^2 + M_k^2}$

$= 1,4 kNm$

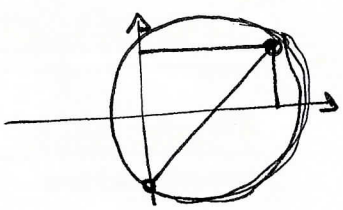


TRACCIÓN DE FLEXIÓN + TRACC DIRECTA

$$\sigma_x = + \frac{M \, d/2}{\frac{\pi (d/2)^4}{4}} + \frac{F_j}{\pi (d/2)^2} = 115,7 \, MPa$$



$$\tau_{xy} = \frac{T \, d/2}{\frac{\pi (d/2)^2}{2}} = 40,7 \, MPa$$



$\sigma_1 = 128,5 \, MPa$

$\sigma_2 = 17,5 \, MPa$ $\quad \sigma_3 = 0$ $\quad \tau_{MAX} = 64,2 MPa$

2 -

25 m^3 en recipiente esférico es posible?

$\phi_{MAX} = 3{,}5\,m$ RESTRICCIÓN TECHO

$\frac{4}{3}\pi R^3 = Vol\ esf = 25\,m^3 \rightarrow R = 1{,}81\,m$

$\phi = 3{,}62\,m$ X

→ NO SE PUEDE HACER UN ESFÉRICO

→ CILÍNDRICO $FSVM = 1{,}7 = \frac{\sigma_f}{\sqrt{3}\,\sigma_L}$

→ $\sigma_L = \frac{\sigma_f}{1{,}7\sqrt{3}} \cong 170\,MPa$

$\sigma_L = \frac{pi\,\phi}{4t} \Rightarrow \phi = 2{,}95\,m \approx 2{,}9\,m$ redondeo

para tener 25 m^3 $Vol\ tot = \underbrace{\frac{4}{3}\pi R^3}_{12{,}77\,m^3} + \pi R^2 \cdot L$

$L = \frac{25 - 12{,}77}{\pi R^2} = \frac{12{,}23}{\pi R^2} = 1{,}85 \approx 1{,}90\,m$

$\phi = 2{,}9 \quad L = 1{,}9 \quad L_{TOT} = 4{,}8\,m$

$FVM = 1{,}73 \quad V_{TOT} = 25{,}3\,m^3$