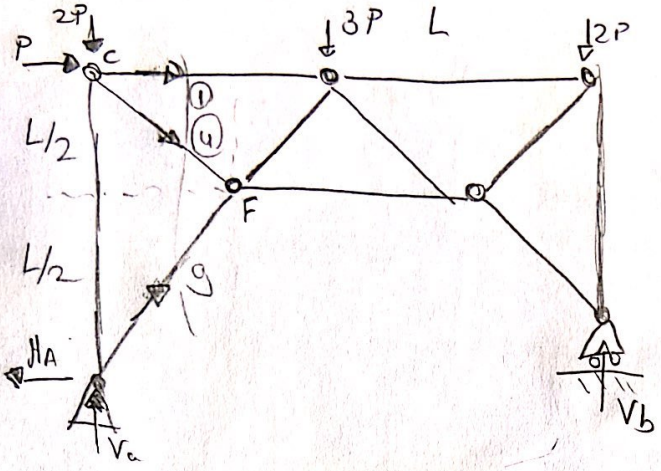
Iga Eiki F. Kubota
Ra: 19.024 66-5

ETE702D

Iga Eiki

(1)



$2(n) = V + B$

$2(7) = 11 + 3 \rightarrow$ isostática

$\sum F_x = 0 \rightarrow H_a = P$

$\sum M_B = 0 \quad (+)$

$3P(L) + 2P(2L) - V_a(2L) + P(L) = 0$

$3P = V_a$

(1)

$\sum M_{F_1} = 0$

$+F_1\left(\frac{L}{2}\right) + P\left(\frac{L}{2}\right) + P\left(\frac{L}{2}\right) - 2P\left(\frac{L}{2}\right) + 3P\left(\frac{L}{2}\right) = 0$

$\boxed{F_1 = -3P} \rightarrow$ compressão

$\sum M_D = 0$

$+F_4 \operatorname{sen}\theta(L) + 3P(L) - P(L) + 2P(L) = 0$

$F_4 \operatorname{sen}\theta = 2P \Rightarrow F_4 = \frac{2P}{\operatorname{sen}45}$

$\boxed{F_4 = 2{,}828P}$

$\sum M_C = 0$

$+F_3 \cos\theta(L) - P(L) = 0$

$F_3 = \frac{P}{\cos 45} \Rightarrow \boxed{F_3 = 1{,}414P}$

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$$\lambda_{lim} = \sqrt{\frac{\pi^2 \cdot E}{0,5\,\sigma}} = \sqrt{\frac{\pi^2 \cdot 200.10^3}{0,5 \cdot 310}} = 112,85$$

$$\lambda_1 = \frac{k \cdot L}{i_{min}} = \frac{5000}{15} = 263,158$$

$\lambda_1 > \lambda_{lim}$ ⇒ Elástico ⇒ Euler

$$\sigma_{F_1} = \frac{\pi^2 \cdot E}{\lambda^2} = \frac{\pi^2 \cdot 200.10^3}{(263,158)^2} = 28,503\ MPa$$

$$F_{max} = A \cdot \frac{\sigma_{F1}}{S} \Rightarrow 1550 \cdot \frac{28,503}{1,8} = 24544,25$$

$$F_1 = 3\,P_{max}$$

$$P_{max} = \frac{F_1}{3} \Rightarrow \frac{24544,23}{3}$$

$$P_{máx} = 8181,417\ N$$

$$\boxed{P_{máx} = 8,181\ kN}$$

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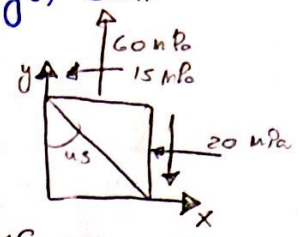

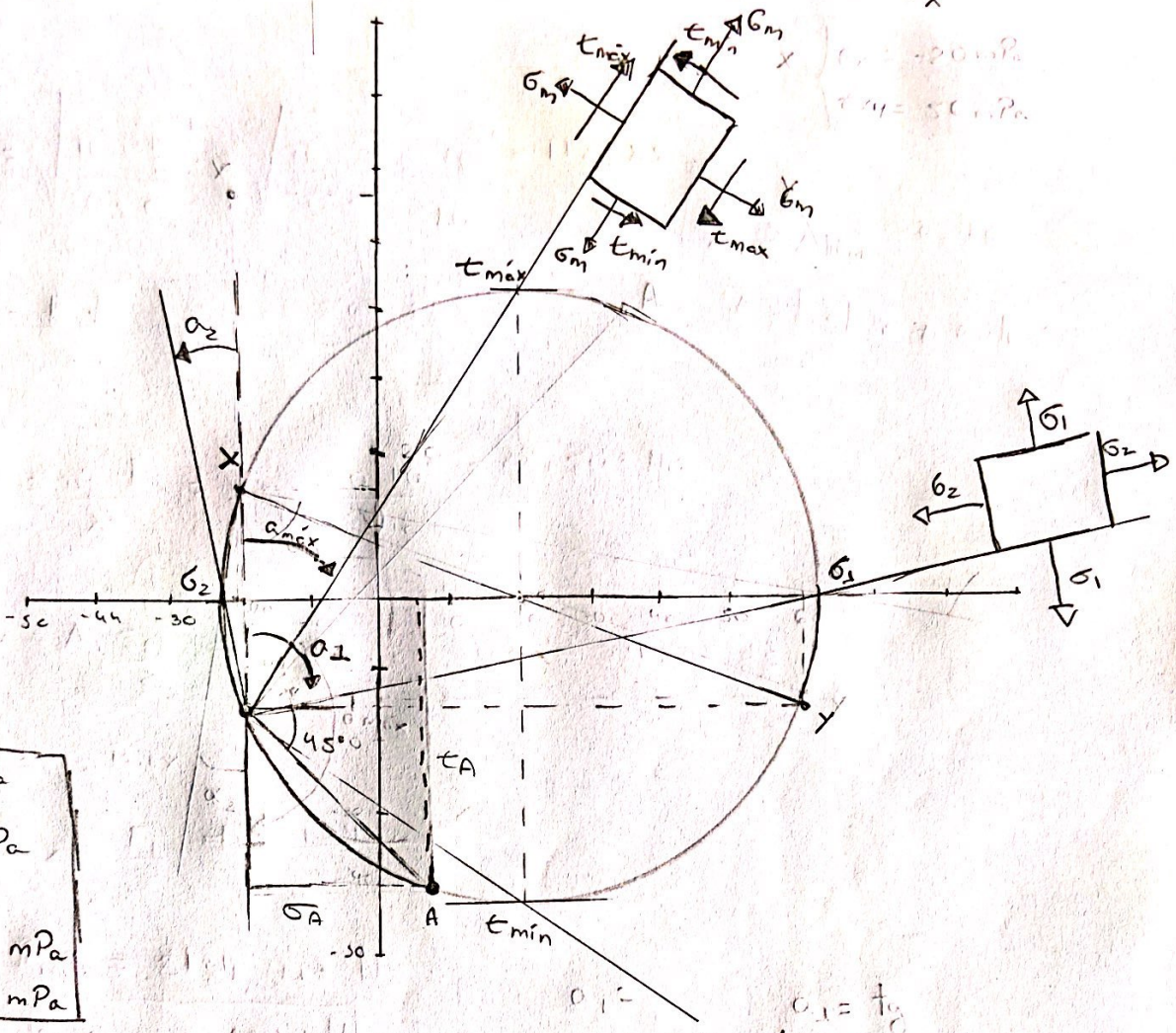

$\sigma_m = 20$

$\sigma_1 = +63$ mPa

$\sigma_2 = -23$ mPa

$\tau_{máx} = 43$ mPa

$\tau_{mín} = -43$ mPa

$\sigma_A = 5{,}0$

$\tau_A = -40{,}0$

$$tg\,\alpha_1 = \frac{\sigma_x - \sigma_1}{\tau_{xy}}$$

$$\alpha_1 = \frac{-20 - 63}{15}$$

$\alpha_1 = -79{,}76°$

x { $\sigma_x = -20$ mPa ; $\tau_{xy} = +15$ mPa

y { $\sigma_x = +60$ mPa ; $\tau_{yx} = -15$ mPa

$\alpha_2 = \alpha_1 + 90$

$\alpha_2 = 10{,}24°$

$\alpha_{máx} = \alpha_1 + 45$

$\alpha_{máx} = -34{,}76°$