Exercício 3.02

$$A = \pi\frac{\ell^2}{4} - \pi\frac{\alpha^2\ell^2}{4} = \pi\frac{\ell^2}{4}\left(1-\alpha^2\right)$$

$$J_{xx} = J_{yy} = \frac{\pi\ell^4\left(1-\alpha^4\right)}{64} \qquad W_{xx} = W_{yy} = \frac{\pi\ell^3}{32}\left[1-\alpha^4\right]$$

$$J_p = \frac{\pi\ell^4\left(1-\alpha^4\right)}{32} \qquad W_p = \frac{\pi\ell^3}{16}\left(1-\alpha^4\right)$$

- $\left|Mf_{\substack{A-A \\ x-x}}\right| = \left|F\cdot\lambda\ell - F\cdot\alpha\cdot\lambda\ell\right|$, considero $\alpha < 1$

$$Mf_{\substack{A-A \\ y-y}} = 0$$

$$\sigma_{fAA-A} = \frac{F\lambda\ell - F\alpha\lambda\ell}{W_{xx}}$$

$$\sigma_{fAA-B} = 0$$

$$\sigma_{fAA-C} = -\frac{F\lambda\ell - F\alpha\lambda\ell}{W_{xx}}$$

- $Mt_{AA} = F\cdot\lambda\ell - \alpha F\cdot(\lambda\ell - \beta\ell)$

$$\tau_{MtAAA} = \tau_{MtAAB} = \tau_{MtAAC} = \frac{Mt}{W_p}$$

- $\tau_{medio} = \dfrac{F - \alpha F}{A}$ $\quad (T_{A-A} = F - \alpha F)$

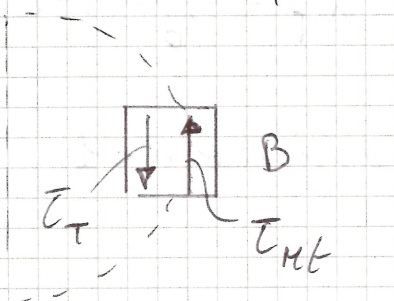
$$\tau_{TA_{A-A}} = \tau_{TC_{A-A}} = 0$$

$$\tau_{TB_{A-A}} = \tau_{medio}\,\frac{4}{3}\left(1 + \frac{1}{\frac{1}{\alpha} + \alpha}\right)$$

- No ponto A há σ_f e τ_{Mt}

$$\sigma_{1-2\,A} = \frac{\sigma_{f_A}}{2} \pm \sqrt{\frac{\sigma_{f_A}^2}{4} + \tau_{Mt_A}^2}$$

- No ponto B há τ_{Mt} e τ_T



$$\sigma_{1-2\,B} = \pm \sqrt{(|\tau_{Mt_B}| - |\tau_{T_B}|)^2}$$