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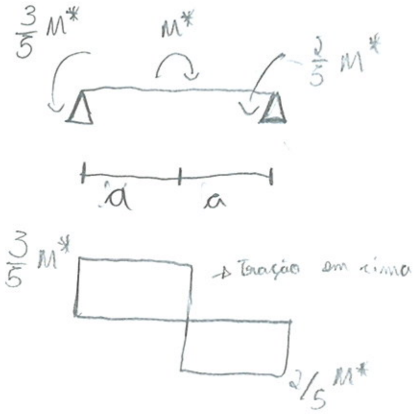
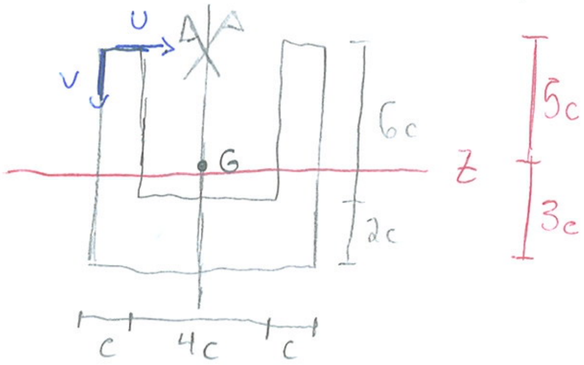
Tensões Normais

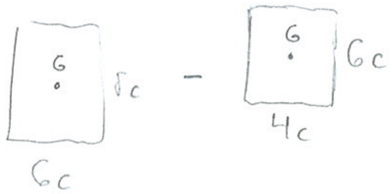
R1 - Exercício - 18/04/18





$\sigma_{t,\,máx}$ e $\sigma_{c,\,máx}$?

• Achar coordenada em V do centro de gravidade:



$$V_G = \frac{\overbrace{(6c \cdot 8c}^{Área} \cdot \overbrace{4c}^{V_1}) - (\overbrace{4c \cdot 6c}^{Área} \cdot \overbrace{3c}^{V_2})}{(6c \cdot 8c) - (4c \cdot 6c)} = \frac{120c^3}{24c^2} = 5c$$

$\frac{S_U}{A}$

$$I_U = \frac{6c \cdot (8c)^3}{3} - \frac{4c \cdot (6c^3)}{3} = 736c^4$$

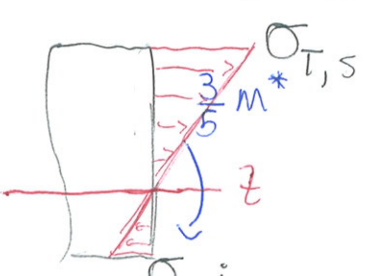
$$I_z = 8c^4 - d^2 \cdot A = c^4 - (5c)^2 \cdot [(6c \cdot 8c) - (4c \cdot 6c)] = 736c^4 - 600c^4 = \boxed{136c^4}$$

I_z

• $W_{z,s} = \frac{I_z}{y_s} = \frac{136c^4}{5c} = \boxed{\frac{136c^3}{5}}$ ↳ Superior

• $W_{z,i} = \frac{I_z}{y_i} = \frac{136c^4}{3c} = \boxed{\frac{136c^3}{3}}$ ↳ inferior

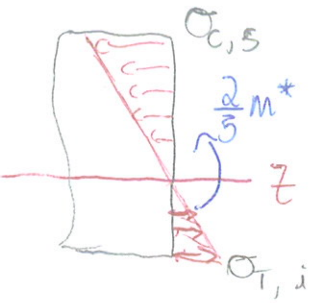
• ① Momento $\frac{3}{5}M^*$



$$\sigma_{T,S} = \frac{M_z}{W_{z,s}} = \frac{\frac{3}{5}M^*}{\frac{136c^3}{5}} = \boxed{\frac{3M^*}{136c^3}} = 0{,}022\frac{M^*}{c^3}$$ ✓

$$\sigma_{c,i} = \frac{M_z}{W_{z,i}} = \frac{\frac{3}{5}M^*}{\frac{136c^3}{3}} = \boxed{\frac{9M^*}{680c^3}} = 0{,}013\frac{M^*}{c^3}$$

② Momento $\frac{2}{5}M^*$



$$\sigma_{C,S} = \frac{M_z}{W_{z,s}} = \frac{\frac{2}{5}M^*}{\frac{136c^3}{5}} = \boxed{\frac{M^*}{68c^3}} = 0{,}015\,\frac{M^*}{c^3} \quad \checkmark$$

$$\sigma_{T,i} = \frac{M_z}{W_{z,i}} = \frac{\frac{2}{5}M^*}{\frac{136c^3}{3}} = \frac{6M^*}{680c^3} = \boxed{\frac{3M^*}{340c^3}} = 0{,}009\,\frac{M^*}{c^3}$$

Comparando os resultados, temos:

$$\boxed{\sigma_{T,máx} = \frac{3}{136}\frac{M^*}{c^3}} \quad e \quad \boxed{\sigma_{C,máx} = \frac{M^*}{68c^3}} = 0{,}015\,\frac{M^*}{c^3}$$

$\hookrightarrow = 0{,}022\,\frac{M^*}{c^3}$