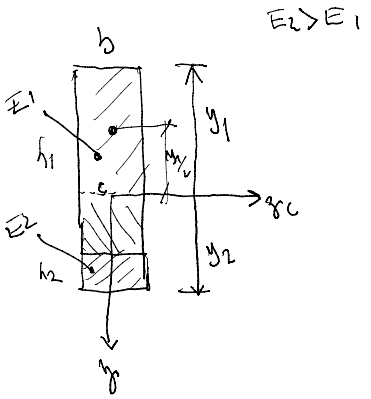
Tensões normais em vigas compostas

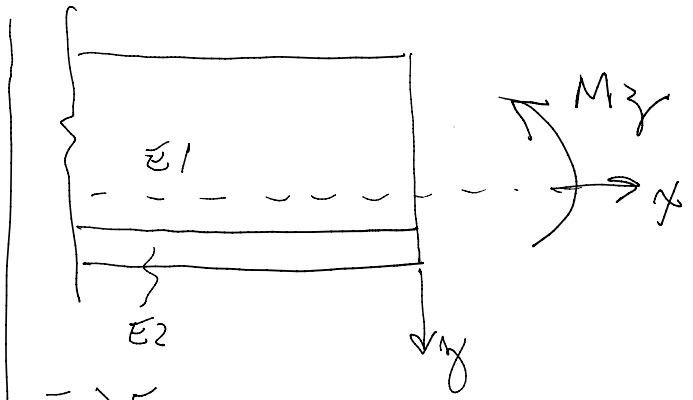
Monday, May 25, 2020 4:13 AM



$b = 20\,cm$ $h_1 = 40\,cm$ $h_2 = 2\,cm$

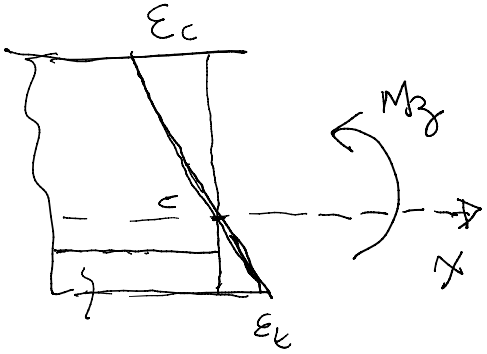
$E_1 = 210\,GPa$

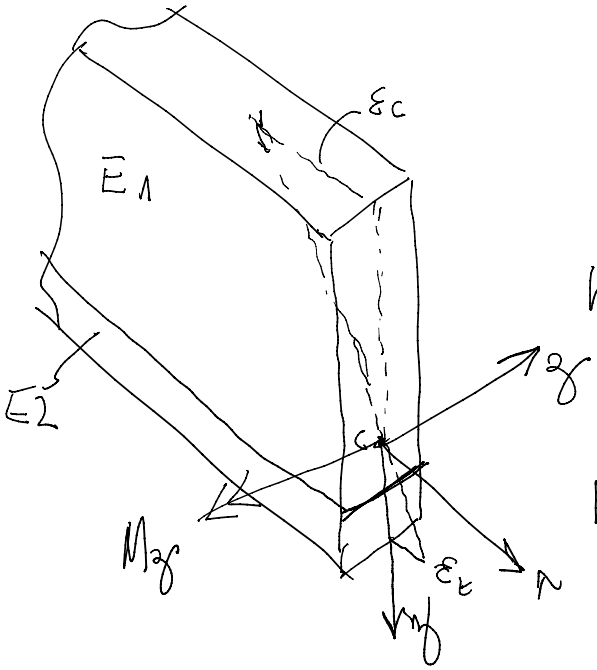
$E_2 = 200\,GPa$

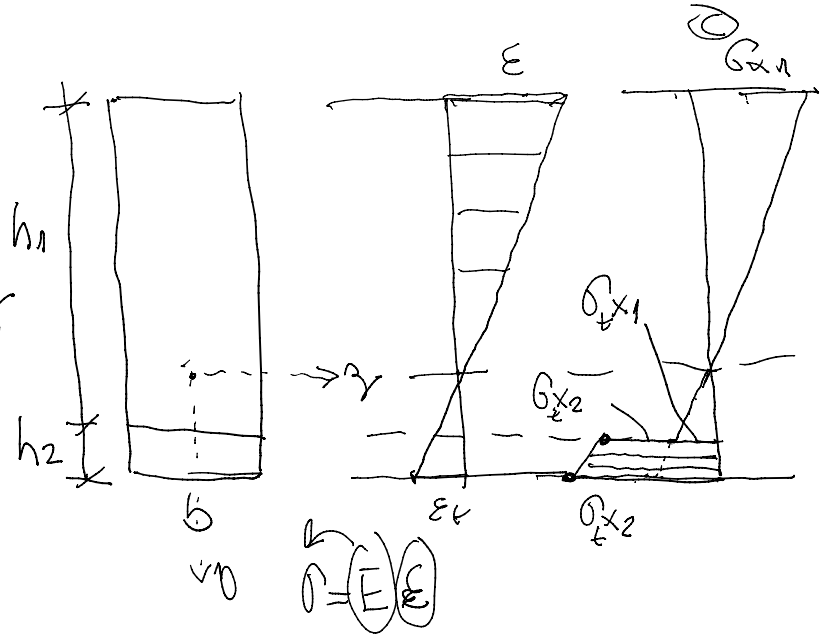


$E_2 > E_1$

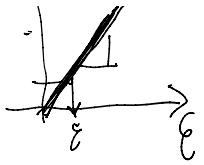
$\therefore N = 0$

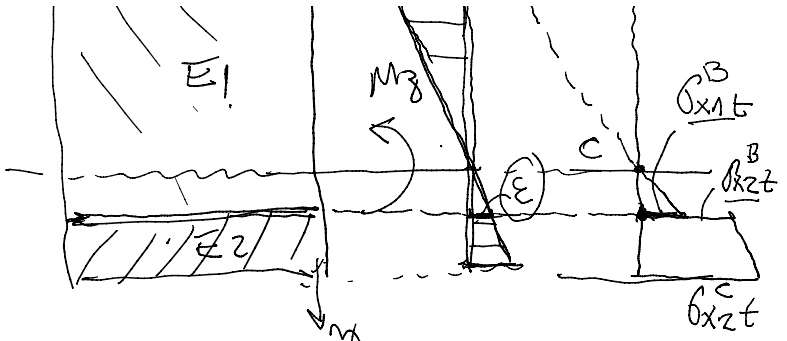


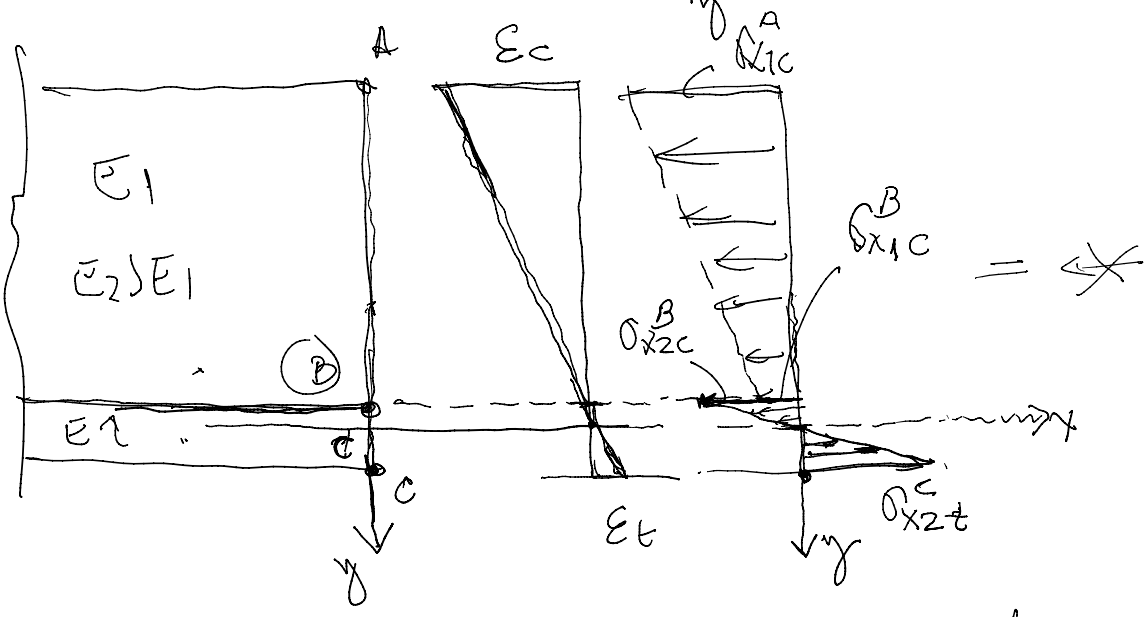




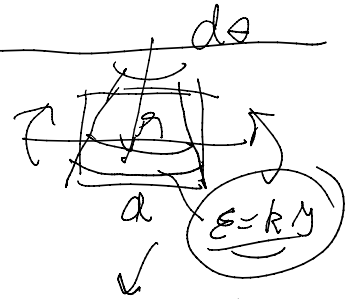








$$\int_1 \sigma_{x1}\,dA + \int_2 \sigma_{x2}\,dA = 0$$



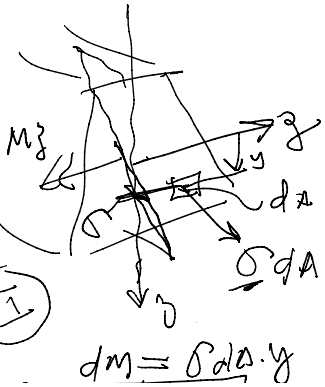
$$\sigma_{x1} = E_1 \varepsilon \quad \text{e} \quad \sigma_{x2} = E_2 \varepsilon \qquad \boxed{\varepsilon = k\,y}$$

$$\boxed{\sigma_{x1} = E_1 \cdot k \cdot y} \qquad \boxed{\sigma_{x2} = E_2 k \cdot y}$$

$$\int_1 E_1 k y \cdot dA + \int_2 E_2 k \cdot y\,dA = 0$$

$$E_1 \int_1 y\,dA + E_2 \int_2 y\,dA = 0$$

$$\boxed{E_1 \int_1 y\,dA + E_2 \int_2 y\,dA = 0}$$



(1)

$E_1 \int_1 y\,dA + E_2 \int_2 y\,dA = M_z$ (I)

$\sigma_{x1} = \sigma_{g1}$ $\quad \sigma_{x2} = \sigma_{g2}$

$dM = \sigma\,dA \cdot y$

$M_z = kEI_z$

$M_z = kEI_z\gamma$ $\quad E_1$ e E_2

$\sigma_{x1} = E_1 k y = \dfrac{E_1 M_z \cdot y}{E_1 I_1 + E_2 I_2}$ (II a)

$\sigma_{x2} = E_2 k y = \dfrac{E_2 M_z \cdot y}{E_1 I_1 + E_2 I_2}$ (II b)

$M_z = \int_1 \sigma_{x1} y\,dA + \int_2 \sigma_x y\,dA$

$M_z = \int_1 kE_1 y^2\,dA + \int_2 kE_2 y^2$

$M_z = k(E_1 I_1 + E_2 I_2)$ $\quad k = \dfrac{M_z}{E_1 I_1 + E_2 I_2}$

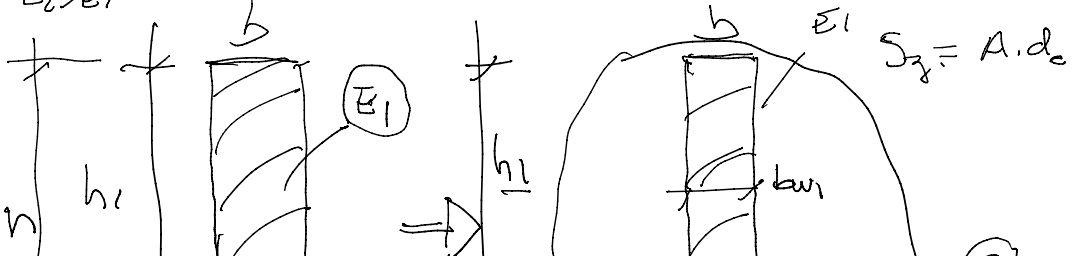
$n = \dfrac{E_2}{E_1}$ $\quad E_2 = n \cdot E_1$

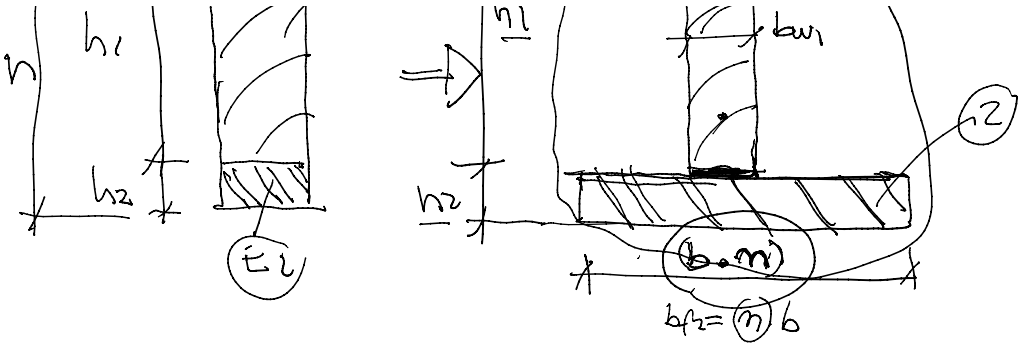
$\int_1 \sigma_{x1}\,dA + \int_2 \sigma_{x2}\,dA = 0$

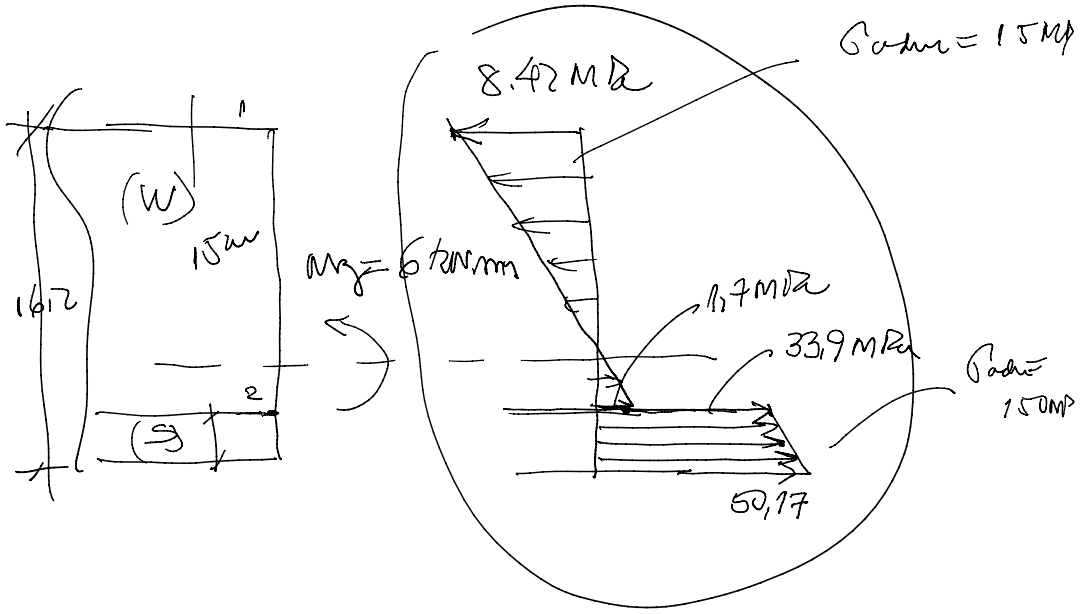
$\int_1 E_1 k y\,dA + \int_2 E_2 k y\,dA = 0$

$E_1 \int_1 y\,dA + E_1 \int_2 n y\,dA = 0$

$E_2 > E_1$







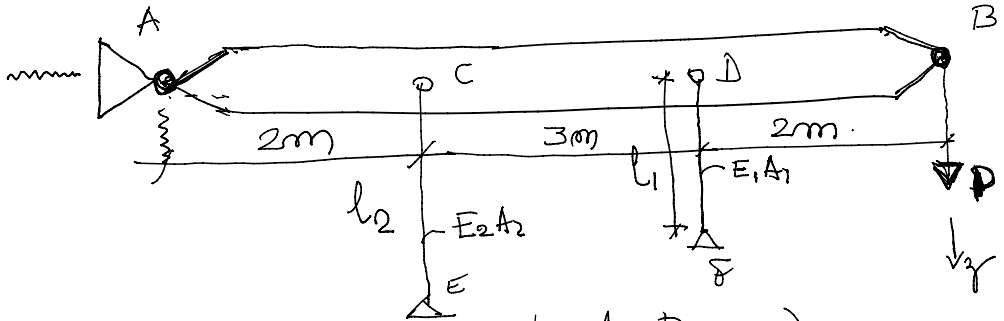
TRABALHO 2

$\sigma_{u_1} = 250\,MPa$ $\sigma_{u_2} = 150\,MPa$ (150)

$l_1 = 2m$ $l_2 = 3m$. $A_1 = 15\,cm^2$

$E_1 = 200\,GPa$ $E_2 = 60\,GPa$ $A_2 = 10\,cm^2$

$P = 450\,kN$



Det. o deslocamento do ponto B (U_{Bz})

Det. as tensões normais nas barras

CE e DF. (σ_2 e σ_1)

CE < DF. (σ_2 e σ_1)

Det. o coef. de segurança do fornecedor estrutural.

$\sigma_{act} \leq \sigma_{adm}$ $\quad \sigma_{adm} = \frac{\sigma_u}{\gamma}$

$\gamma = ?$

Emprego 2/6 $\rightarrow$ Th30 (e-disciplina).

