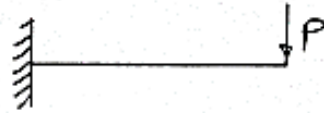
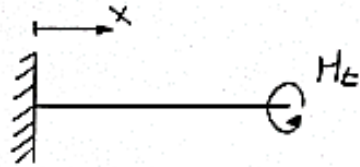


analogie flexion - torsion



condition aux limites :

en $x=0$

$$\begin{aligned} \varphi &= 0 \\ \varphi' &= 0 \\ M_w &\neq 0 \quad (M_w < 0) \end{aligned}$$

$$\begin{aligned} v &= 0 \\ v' &= 0 \\ M &\neq 0 \quad (M < 0) \end{aligned}$$

en $x=L$

$$\begin{aligned} \varphi &\neq 0 \\ \varphi' &\neq 0 \\ M_w &= 0 \end{aligned}$$

$$\begin{aligned} v &\neq 0 \\ v' &\neq 0 \\ M &= 0 \end{aligned}$$

→ on peut utiliser l'analogie

à l'encastrement :

$$M_w = M_t \cdot L = -20 \cdot 1 = -20 \text{ kN}\cdot\text{m}^2$$

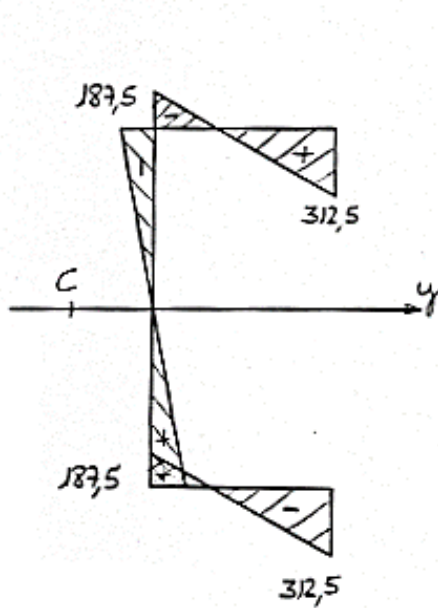
$$T_w = M_t = 20 \text{ kN}\cdot\text{m}$$

contraintes normales:

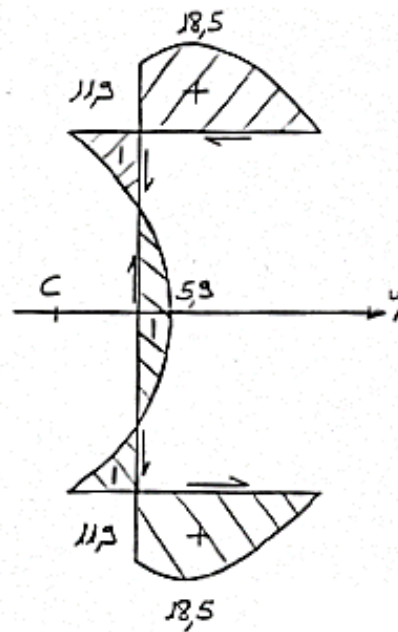
$$\sigma_w = \frac{M_w}{I_w} \cdot w = \frac{-20 \cdot 10^3}{1,444 \cdot 10^6} \cdot w \cdot 10^{-4} = -1,385 \cdot 10^6 w \left[\frac{N}{m^2} \right]$$

contraintes tangentielles:

$$\tau_w = -\frac{T_w \tilde{S}_w}{t I_w} = -\frac{20 \cdot 10^3}{2 \cdot 10^{-2} \cdot 1,444 \cdot 10^6} \tilde{S}_w \cdot 10^{-8} = -6,923 \cdot 10^3 \tilde{S}_w \left[\frac{N}{m^2} \right]$$



$$\sigma_w \left[\frac{N}{mm^2} \right]$$



$$\tau_w \left[\frac{N}{mm^2} \right]$$