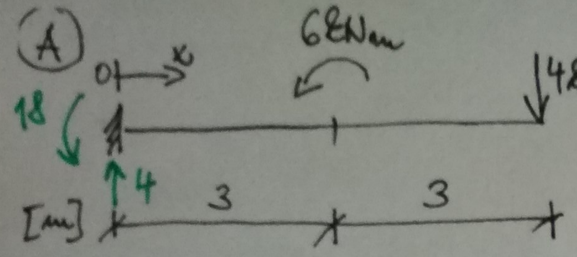
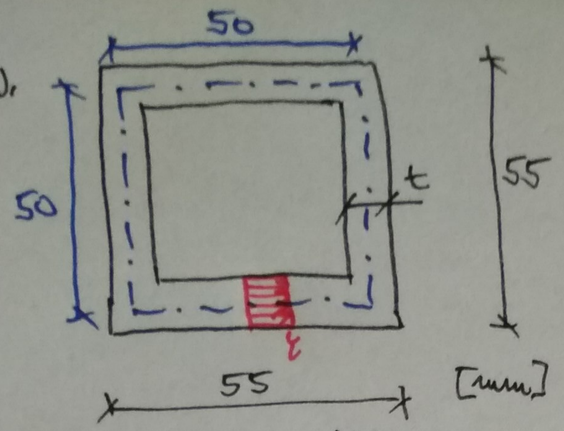
(A)

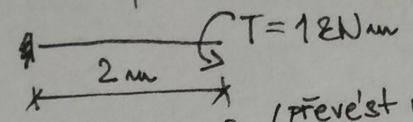


EI = konst.

- rce ohybové čáry Clebschovou metodou
- $w(x=3), w(x=6), \varphi(x=6) = ?$
- kontrola Mohrova metoda $w(x=3)$



$t = 5\,mm$, $G = 81\,GPa$



τ_{max} a $\varphi_l = ?$ (převést na stupně)

- do obrázku načrtněte průběh napětí

$$M(x) = -18 + 4x \Big|_{x>3}^{-6}$$

$$EIw'' = 18 - 4x \Big|_{x>3}^{+6}$$

$$EIw' = C_1 + 18x - 4\frac{x^2}{2} \Big|_{x>3}^{+6(x-3)}$$

$$EIw = C_2 + C_1 x + 18\frac{x^2}{2} - \frac{2x^3}{3} \Big|_{x>3}^{+6\frac{(x-3)^2}{2}}$$

$w(x=0) = 0$

$C_2 + C_1 \cdot 0 + \dots = 0 \Rightarrow C_2 = 0$

$\varphi(x=0) = w'(x=0) = 0$

$C_1 + 18 \cdot 0 - 4 \cdot 0 = 0 \Rightarrow C_1 = 0$

$$w(x) = \frac{1}{EI}\left[9x^2 - \frac{2}{3}x^3 \Big|_{x>3}^{+3(x-3)^2}\right]$$

$$w'(x) = \varphi(x) = \frac{1}{EI}\left[18x - 2x^2 \Big|_{x>3}^{+6(x-3)}\right]$$

$$w(x=3) = \frac{1}{EI}\left[9 \cdot 3^2 - \frac{2}{3}3^3\right] = \frac{63}{EI}$$

$$w(x=6) = \frac{1}{EI}\left[9 \cdot 6^2 - \frac{2}{3}6^3 + 3 \cdot 3^2\right] = \frac{207}{EI}$$

$$A_{\xi} = 50 \cdot 50 = 2500\,mm^2$$

$$W_t = 2 A_{\xi} \cdot t_{min} =$$

$$= 2 \cdot 2500 \cdot 5 = 25 \cdot 10^3\,mm^3$$

$$I_t = \frac{4A_{\xi}^2}{\sum \frac{l_i}{t_i}} = \frac{4 \cdot 2500^2}{4 \cdot \frac{50}{5}} = 625 \cdot 10^3\,mm^4$$

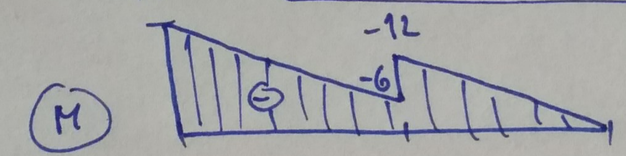
$$\tau_{max} = \frac{10^3}{25 \cdot 10^3 \cdot 10^{-9}} = \frac{T}{W_t} = \underline{40\,MPa}$$

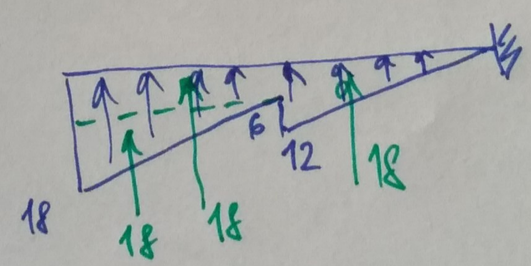
$$\varphi_l = \frac{Tl}{GI_t} = \frac{10^3 \cdot 2}{81 \cdot 10^9 \cdot 625 \cdot 10^3 \cdot 10^{-12}} =$$

$$= \underline{0{,}0395\,rad}$$

$$= 2{,}2635°$$

(M)





$$\tilde{M}(x=3) = 18 \cdot 2 + 18 \cdot 1{,}5 = 63$$

$$w(x=3) = \frac{\hat{M}}{EI} = \frac{63}{EI}$$

$$\varphi(x=6) = w'(x=6) =$$

$$= \frac{1}{EI}\left[18 \cdot 6 - 2 \cdot 6^2 + 6 \cdot 3\right] = \frac{54}{EI}$$