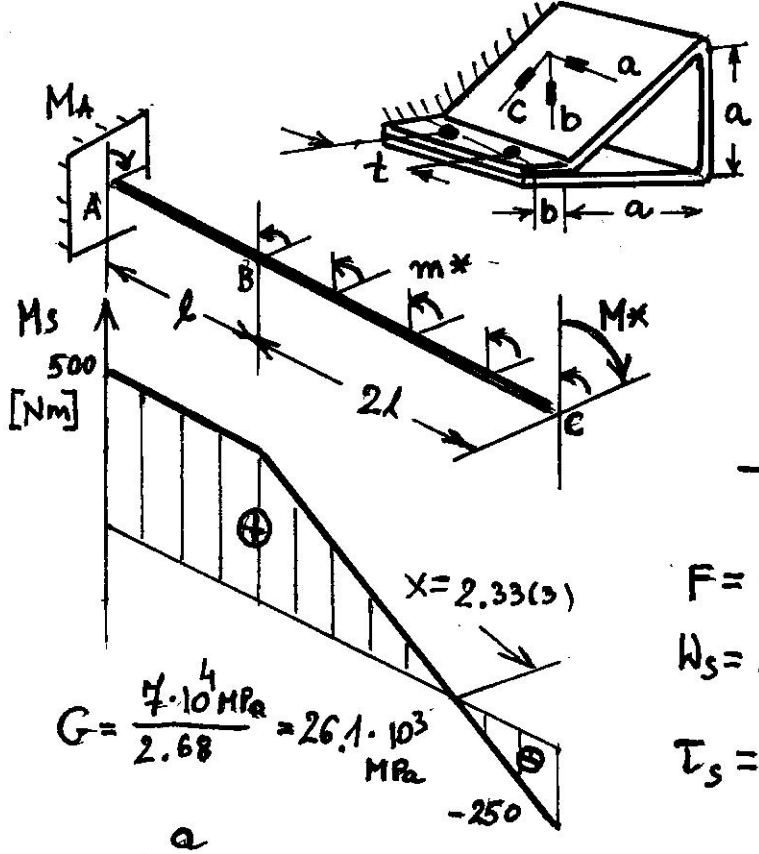


$M^* = 250\ Nm$, $m^* = 375\ \frac{Nm}{m}$

$l = 1\ m$, $a = 100$, $b = 44$,

$\delta = 1$, $t = 25$, $E = 7 \cdot 10^4\ MPa$

$M_A - m^* \cdot 2l + M^* = 0$

$M_A = m^* \cdot 2l - M^* = 375 \cdot 2m\ \frac{Nm}{m} +$

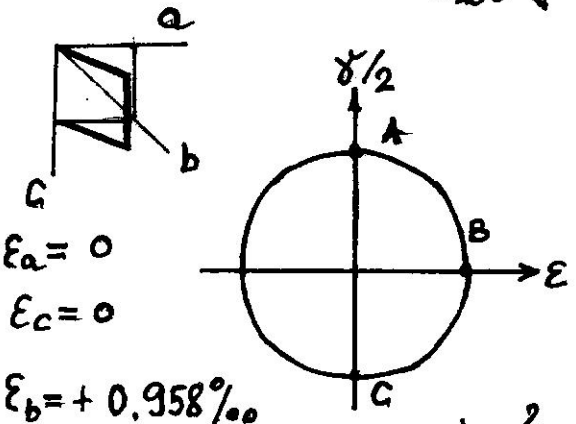
$- 250\ Nm = 500\ Nm$

$F = \frac{1}{2}a^2 = \frac{1}{2} \cdot 10^4\ mm^4 = 5 \cdot 10^3\ mm^2$

$W_S = 2F\delta = 2 \cdot 5 \cdot 10^3\ mm^2 \cdot 1\ mm = 10^4\ mm^3$

$\tau_S = \frac{500 \cdot 10^3\ Nmm}{10^4\ mm^3} = 50\ MPa$

$G = \frac{7 \cdot 10^4\ MPa}{2.68} = 26.1 \cdot 10^3\ MPa$



$\varepsilon_a = 0$

$\varepsilon_c = 0$

$\varepsilon_b = +0.958‰$

$T = \tau_S \cdot \delta \cdot t = 50\ \frac{N}{mm^2} \cdot 1\ mm \cdot 25\ mm = 1250\ N$

$\gamma = \frac{50\ [MPa]}{26.1 \cdot 10^{+3}} = 1.916‰ =$

$\gamma/2 = 0.958‰$

$\oint \frac{ds}{\delta} = \frac{a(2+\sqrt{2}) + 2 \cdot b}{\delta} = \frac{100 \cdot 3.41 + 2 \cdot 44}{1} =$

$= 429$

$J_S = \frac{4F^2}{\oint \frac{ds}{\delta}} = \frac{4 \cdot 5^2 \cdot 10^6\ mm^4}{429} = 2.33 \cdot 10^5\ mm^4$

$GJ_S = 2.61 \cdot 10^4\ \frac{N}{mm^2} \cdot 2.33 \cdot 10^5\ mm^4 = 6.084 \cdot 10^9\ Nmm^2$

$x \in (0, l)$:

$\theta = \frac{M_S}{GJ_S} = \frac{500 \cdot 10^3\ N\ mm}{6.084 \cdot 10^9\ N\ mm^2} = 0.8218 \cdot 10^{-4}\ \frac{1}{mm}$

$x \in (l, 3l)$:

$\theta(l+) = 0.8218 \cdot 10^{-4}\ \frac{1}{mm}$, $\theta(3l) = -0.4109 \cdot 10^{-4}\ \frac{1}{mm}$

$\varphi(l) = 0.8218 \cdot 10^{-4}\ \frac{rad}{mm} \cdot 10^3\ mm = 0.08218\ rad = 4.7°$

$\varphi(2.333) = 0.08218\ rad + \frac{1}{2} \cdot 0.08218 \cdot 10^{-3}\ \frac{rad}{mm} \cdot 1.333\ mm \cdot 10^3 =$

$= 0.08218\ rad + 0.05477\ rad = 0.13695\ rad = 7.85°$

$\varphi(3l) = 0.13695\ rad - \frac{1}{2} \cdot 0.4109 \cdot 10^{-4}\ \frac{rad}{mm} \cdot 0.667 \cdot 10^3\ mm = 0.13695\ rad +$

$- 0.01369\ rad = 0.12326\ rad = 7.06°$