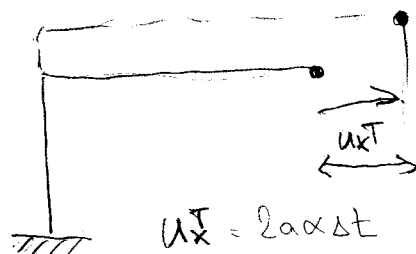
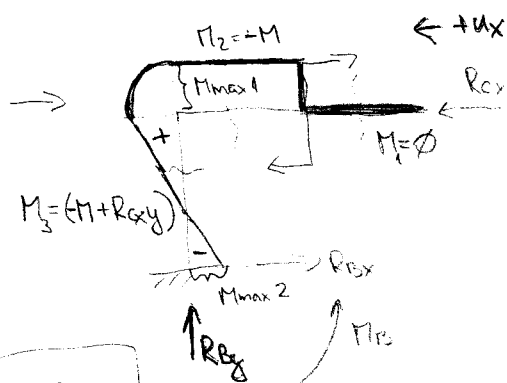


$$x: -R_{Cx} + R_{Cx} = 0$$

$$y: R_{By} = 0$$

$$\Pi_0: R_{Cx} \cdot a + M - M_B = 0$$

$$\rightarrow 1 \times SN \Rightarrow \text{def podmínka } u_{Cx} = u_{Cx}^F + u_{Cx}^T = 0$$



$$u_{Cx}^T = 2ax\Delta t$$

$$u_{Cx}^F = \int_0^a \frac{\Pi_0(s) \cdot m \cdot ds}{EI} = \frac{1}{EI} \left[0 + \int_0^{2a} M \cdot 0 \, dx + \int_0^a (M + R_{Cx} \cdot y) \cdot y \, dy \right]$$

$$= \frac{1}{EI} \int_0^a (-My + R_{Cx} y^2) \, dy = \frac{1}{EI} \left[-M \frac{y^2}{2} + R_{Cx} \frac{y^3}{3} \right]_0^a =$$

$$= \frac{1}{EI} \left[-M \frac{a^2}{2} + R_{Cx} \frac{a^3}{3} \right], \quad J = \frac{\pi d^4}{64}$$

$$u_{Cx} = u_{Cx}^F - u_{Cx}^T = 0$$

$$0 = \frac{1}{EI} \left[-M \frac{a^2}{2} + R_{Cx} \frac{a^3}{3} \right] - 2ax\Delta t$$

$$0 = -M \frac{a^2}{2} + R_{Cx} \frac{a^3}{3} - 2ax\Delta t EI$$

$$R_{Cx} = \frac{M \frac{a^2}{2} + 2ax\Delta t EI}{\frac{a^3}{3}} \rightarrow \text{použiji excelu}$$

$$\approx 790$$

$$R_{Cx} \approx 643 \text{ N}$$

$$\rightarrow \text{po opravě zanedbáváme} \\ R_{Cx} = 787,3 \text{ N}$$

\Rightarrow výpočet reakcí:

$$-R_{Cx} + R_{Cx} = 0 \rightarrow R_{Cx} = R_{Cx} = 643 \text{ N}$$

$$R_{By} = 0$$

$$= -787,28 \cdot 0,7 + 300 = -251,1 \text{ N}$$

$$R_{Cx} \cdot a - M + M_B \rightarrow M_B = -R_{Cx} \cdot a + M = 750,1 \text{ Nm}$$

Maximální moment

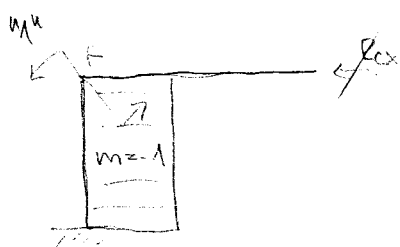
$M_{max1} \times M_{max2}$

$$M_{max1} = 300 \text{ Nm}$$

$$M_{max2} = -M + R_c \cdot a = 254,1 \text{ Nm}$$

$$\sigma_0 = \frac{M_0}{W_0} = \frac{300}{\frac{\pi d^3}{32}} = 113,2 \text{ MPa}$$

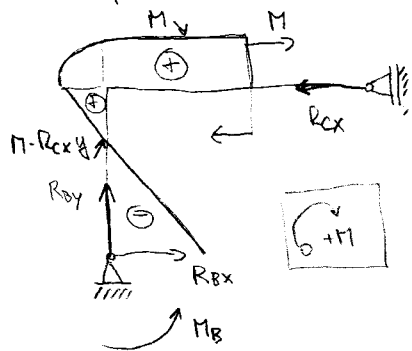
Pootočení v místě A:



$$\varphi_A^t = 0$$

$$\begin{aligned} \varphi_A &= \frac{1}{EI} \left[0 + 0 + \int_0^a (-M + R_{cx} \cdot y) \cdot (-1) dy \right] = \\ &= \frac{1}{EI} \left[\int_0^a (+M - R_{cx} \cdot y) dy \right] = \frac{1}{EI} \left[+My - R_{cx} \frac{y^2}{2} \right]_0^a = \\ &= \frac{1}{EI} \left[+Ma - R_{cx} \frac{a^2}{2} \right] = \frac{1}{E \frac{\pi d^4}{64}} \left[300 \cdot 0,7 - \frac{1}{2} \cdot 787,28 \cdot 0,7^2 \right] = \\ &= 2,1 \cdot 10^{-3} \text{ °} \end{aligned}$$

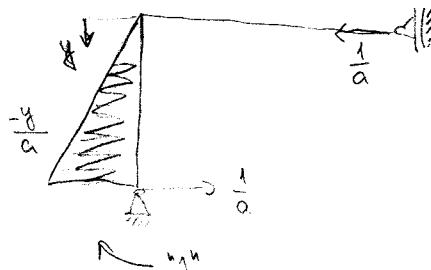
2. zprásoob



$$x: R_{Bx} - R_{Cx} = 0$$

$$y: R_{By} = 0$$

$$M: M - M_B - R_{Cx} \cdot a = 0$$



$$\varphi_B = 0 = \varphi_{MB} - \varphi_T = \frac{1}{EJ} \left[\int_0^a (\pi - R_{Cx} y) \frac{y}{a} dy \right] - \varphi_T = -\frac{1}{EJ} \int_0^a \left(\frac{M_y}{a} - \frac{R_{Cx} y^2}{a} \right) dy - \varphi_T =$$

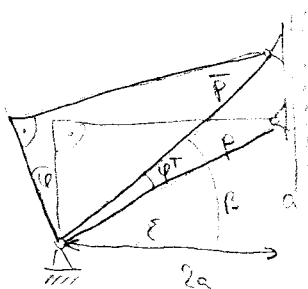
$$= -\frac{1}{EJ} \left(\frac{\pi a^2}{2a} - \frac{R_{Cx} a^3}{3a} \right) - \varphi_T \Rightarrow -3Ma + 2R_{Cx} a^2 = 6EJ \varphi_T$$

$$R_{Cx} = \frac{6EJ \varphi_T + 3Ma}{2a^2} = \frac{6 \cdot 21 \cdot 10^5 \cdot \frac{\pi d^4}{64} \cdot 2,79 \cdot 10^{-3} + 3 \cdot 300 \cdot 10^3 \cdot 700}{2 \cdot 700^2} = 39760,8$$

$$R_{Cx} = 785,5 \text{ N}$$

$$\Rightarrow R_{Bx} = R_{Cx} = 785,5 \text{ N}$$

$$M_B = M - R_{Cx} a = 300 \cdot 785,5 \cdot 0,7 = -249,9 \text{ Nm}$$

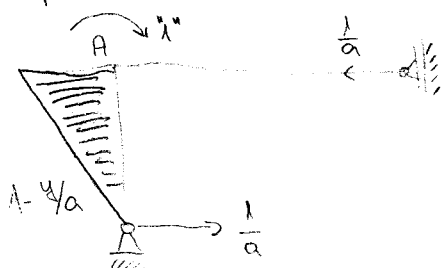


$$\bar{p} = p(1 + \alpha \Delta t)$$

$$\gamma = \arctg \frac{a}{2a} = 26,57^\circ$$

$$\varphi_T = \arccos \frac{2a}{\bar{p}} - \gamma = \arccos \frac{2a}{p(1 + \alpha \Delta t)} - \gamma = \arccos \frac{2 \cdot 0,7}{\sqrt{5 \cdot 0,7^2} (1 + 16 \cdot 10^{-5} \cdot 90)} - 26,57 = 0,16^\circ \Rightarrow 2,79 \cdot 10^{-3} \text{ rad}$$

Pootáčení v bodě A:



$$\varphi_A = \frac{1}{EJ} \left[\int_0^a (\pi - R_{Cx} y) \left(1 - \frac{y}{a}\right) dy \right] = \frac{1}{EJ} \int_0^a \left(\pi - \frac{M_y}{a} - R_{Cx} y + \frac{R_{Cx} y^2}{a} \right) dy =$$

$$= \frac{1}{EJ} \left(\pi a - \frac{\pi a}{2} - \frac{R_{Cx} a^2}{2} + \frac{R_{Cx} a^3}{3a} \right) = \frac{1}{EJ} \left(\frac{\pi a}{2} - \frac{R_{Cx} a^2}{6} \right) =$$

$$= \frac{1}{21 \cdot 10^5 \cdot 39760,8} \left(\frac{300 \cdot 10^3 \cdot 700}{2} - \frac{785,5 \cdot 700^2}{6} \right) = 2,09 \cdot 10^{-3}$$