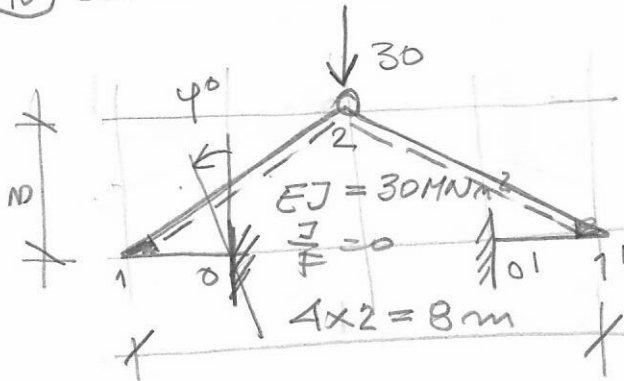


24.07.2020.

OTPORNOST MATERIJALA 2

10) ZA NOSAČ I OPTEREĐENJE NA SKICI!

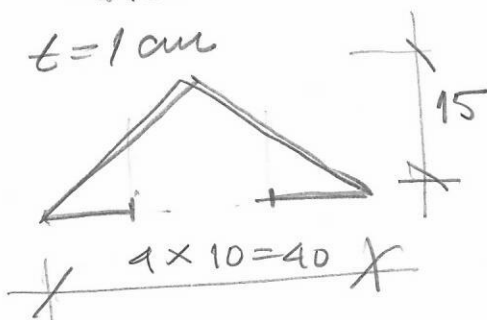


a) NACRTATI DIJAGRAME PRESECNIH SILA OD ZADATOG OPTEREĐENJA

b) NACRTATI DIJAGRAMI MOMENATA OD $\Delta t = 20^{\circ}C$ NA POJASU 1-2-1' AKO JE $\alpha_t = 1 \cdot 10^{-5} 1/C$, $t_c = 0,6m$

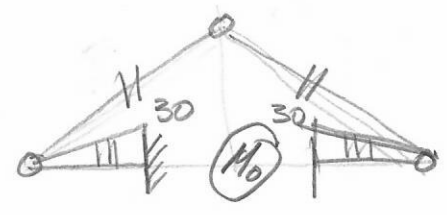
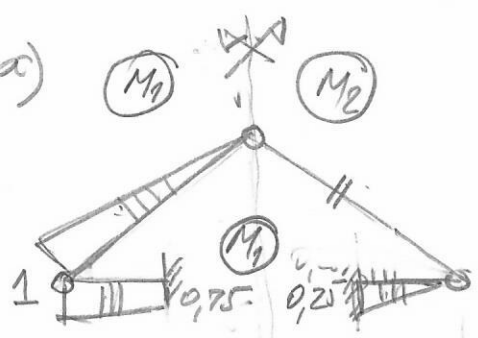
- c) DIJAGRAM MOMENATA OD $\varphi_0 = 1^{\circ}$
- d) ODREDITI USIB ν_2 OD OPTEREĐENJA POD a)
- e) SKICIRATI DEFORMISANU OSU NOSAČA OD OPT. POD a)

20) ZA TANKOZIDNI PRESEK NA SKICI ODREDITI POLOŽAJ CENTRA SMICANJA



10

a)

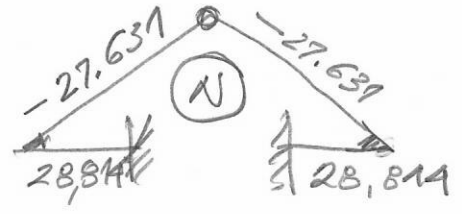
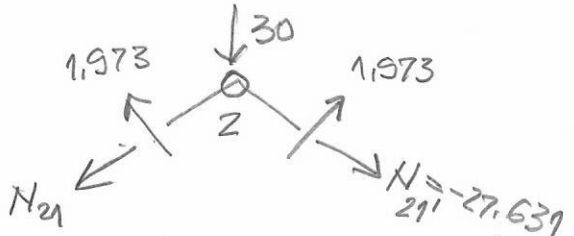
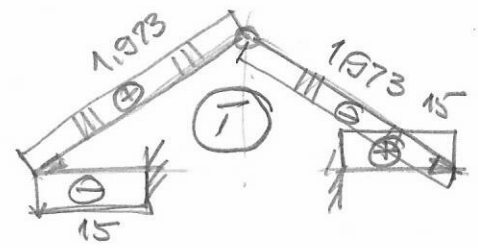
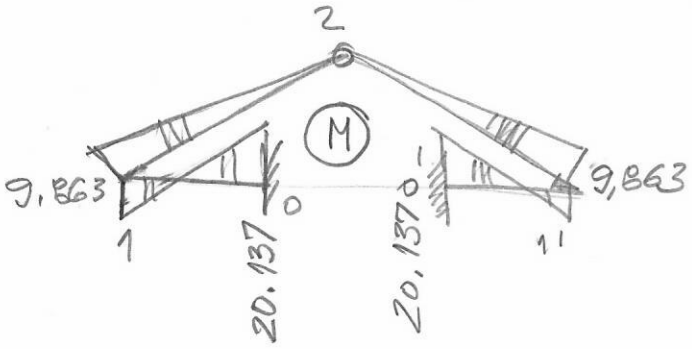


$$EJ\delta_{11} = \frac{5}{3} \cdot 1^2 + \frac{2}{3} (1^2 + 0,25 \cdot 1 + 0,25^2) + \frac{2}{3} \cdot 0,25^2 = 2,563 = EJ\delta_{22}$$

$$EJ\delta_{12} = 2 \cdot \frac{2}{6} \cdot 0,25 (2 \cdot 1 + 0,75) = 0,4583 = EJ\delta_{21}$$

$$EJ\delta_{10} = EJ\delta_{20} = -\frac{2}{6} \cdot 30 (1 + 2 \cdot 0,75) - \frac{2}{3} \cdot 30 \cdot 0,25 = -30$$

$$X_1 = 9,863 = X_2$$

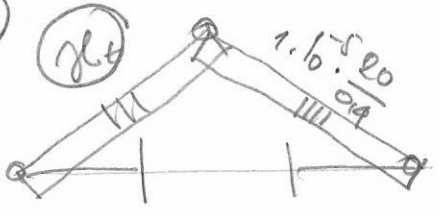


$$\sum V = 2 (N_{21} \cdot 0,6 - 1,973 \cdot 0,8) + 30 = 0$$

$$N_{21} = 27,631$$

$$N_{10} = 27,631 \cdot 0,8 + 1,973 \cdot 0,6 = 28,814$$

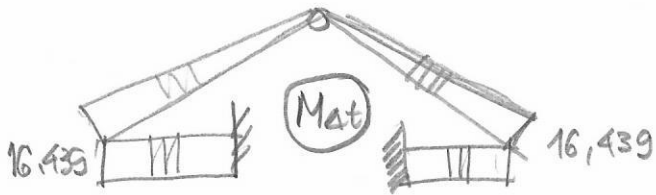
b)



$$EJ_c \delta_{14t} = EJ_c \delta_{24t} =$$

$$= -30 \cdot 10 \cdot 2 \cdot \frac{5}{2} \cdot 1,10 \cdot \frac{20}{0,6} \cdot 1 = -50$$

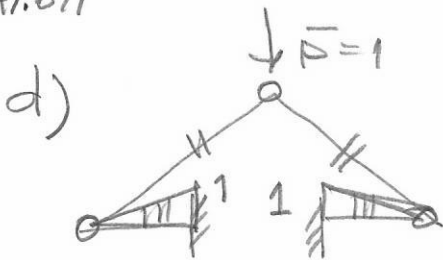
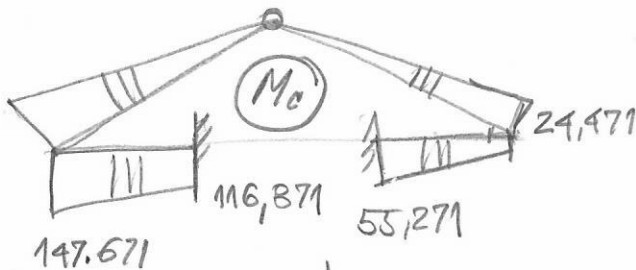
$$X_1 = X_2 = 46,439 \text{ kNm}$$



$$c) EJc \delta_{1AC} = -30 \cdot 10^3 \cdot 1 \cdot \frac{\pi}{180} \cdot 0,75 = -392,700$$

$$EJc \delta_{2C} = -30 \cdot 10^3 \cdot 1 \cdot \frac{\pi}{180} \cdot 0,25 = -130,900$$

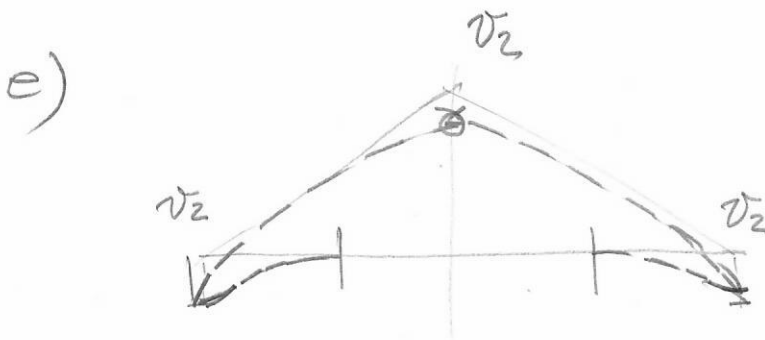
$$x_1 = 147,671 \quad x_2 = 24,471$$



$$EJc v_2 = 2 \cdot \frac{2}{6} \cdot 1 \cdot (2 \cdot 20,137 - 9,863)$$

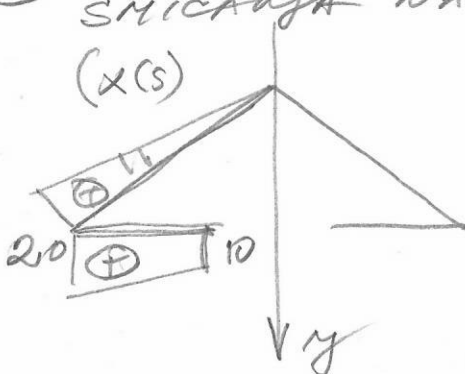
$$= 20,274$$

$$v_2 = \frac{20,274 \cdot 10^{-3}}{30} = 0,676 \cdot 10^{-3} \text{ m}$$



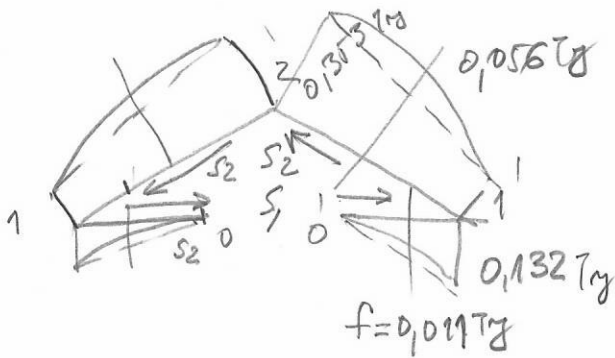
20) ZBOG SIMETRije PRESEKA CENZAR SMICANJA NALAZI SE NA OSI SIMETRije

(x(s))



$$J_y = 2 \cdot 1 \cdot \left[\frac{25}{3} \cdot 20^2 + \frac{10}{3} (20^2 + 10 \cdot 20 + 10^2) \right]$$

$$J_y = 11333,3 \text{ cm}^4$$



$$\tilde{S}_{x,0} = 0$$

$$\tilde{S}_{x,01} = -1.5 \cdot 12.5 = -62.5 \text{ cm}^3$$

$$\tilde{S}_{x,1} = -1 \cdot 10 \cdot 15 = -150 \text{ cm}^3$$

$$\tilde{S}_{x,12} = -150 - 12.5 \cdot 1 \cdot 15 = -337.5$$

$$\tilde{S}_{x,2} = -150 - 25 \cdot 1 \cdot 10 = -400$$

$$I_{zS,0} = 0$$

$$I_{zS,01} = -\frac{T_x \cdot 10^{-3} \cdot (-62.5) \cdot 10^{-6}}{11333.3 \cdot 10^{-8} \cdot 1 \cdot 10^{-2}} = 0.882 \cdot 10^{-3} \cdot T_x \cdot 62.5 = 0.055 T_x$$

$$I_{zS,1} = 0.882 \cdot 10^{-3} \cdot 150 = 0.132 T_x \text{ [MPa]}$$

$$I_{zS,12} = 0.882 \cdot 10^{-3} \cdot 337.5 = 0.298 T_x \text{ [MPa]}$$

$$I_{zS,2} = 0.882 \cdot 10^{-3} \cdot 400 = 0.353 T_x \text{ [MPa]}$$

$$S_1 = 1 \cdot 10 \cdot 10 \cdot 10 \cdot \left(\frac{0.132}{2} - \frac{2}{3} \cdot 0.011 \right) \cdot 10^3 = 0.059 T_x$$

$$S_2 = 1 \cdot 10 \cdot 25 \cdot 10 \cdot \left(\frac{0.353 + 0.132}{2} + \frac{2}{3} \cdot 0.056 \right) \cdot T_x \cdot 10^3 = 0.782 T_x$$

$$\Sigma V = (S_2 - S_1) \cdot 0.6 = 0 \checkmark$$

$$\Sigma H = 2(0.782 T_x \cdot 0.8 - 0.059 T_x) = 1.00 T_x \checkmark$$

$$\Sigma M_D = 2 \cdot [0.782 T_x \cdot 0.8 \cdot e_y - 0.059 T_x (e_y + 15)] = 0$$

$$0.567 E_y - 0.885 = 0$$

$$e_y = 1.56 \text{ cm}$$

