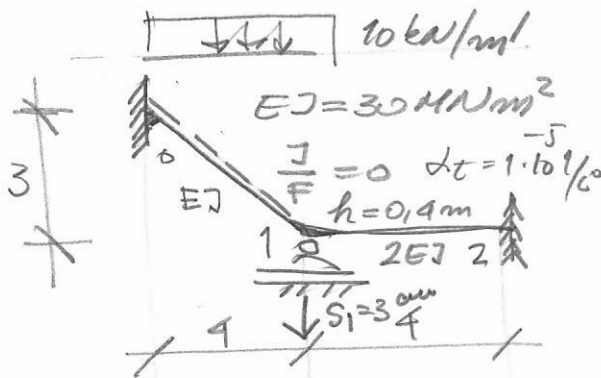


25. 09. 2020.

OTPORNOST MATERIJALA 2

1) ZA NOSAČ I OPTEREĆENJE NA SKICI TREBA:



a) NACRTATI DIJAGRAME PRESEČNIH SILA OD OPTEREĆENJA

b) NACRTATI DIJ. MOMENATA OD  $\Delta t = 20^{\circ}\text{C}$  NA POJASU 0-1

c) NACRTATI DIJAGRAM MOMENATA SAVIJANJA OD  $S_1 = 30\text{ kN}$

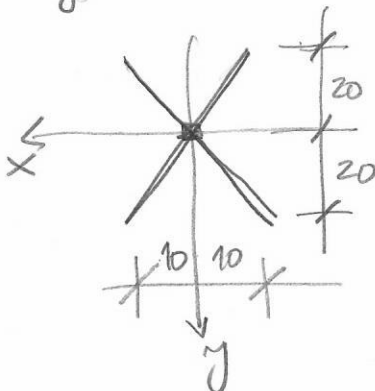
MOMENATA SAVIJANJA OD

d) ODREDITI OBRTAUSJE OŠTIRA 1 OD ZADATOG OPTEREĆENJA

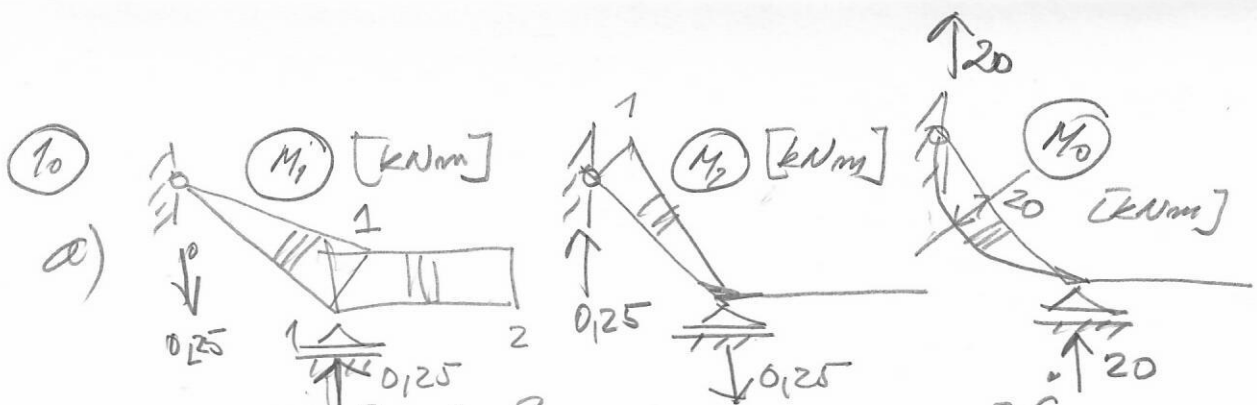
e) SKICIRATI DEF. OSU OD OPTER. POD a)

2) ZA TANKOZIONI NOSAČ NA SKICI TREBA ODREDITI RASTORED NAROVNA SMICANJA OD

$T_y = 30\text{ kN}$   $t = 1\text{ cm}$  I ODREDITI CENTAR SMICANJA.



$\frac{4}{3} \dots$

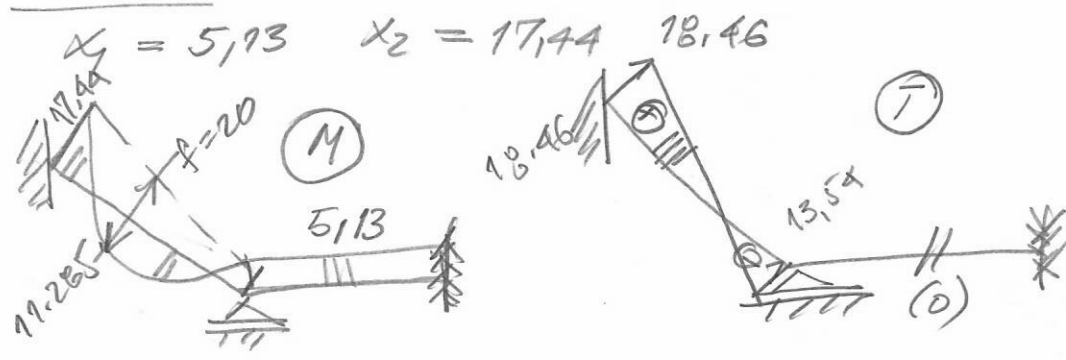


$$EJ \delta_{11} = \frac{5}{3} \cdot 1^2 + \frac{4}{2} \cdot 1^2 = 3,6$$

$$EJ \delta_{12} = EJ \delta_{21} = \frac{5}{6} \cdot 1^2 = 0,83$$

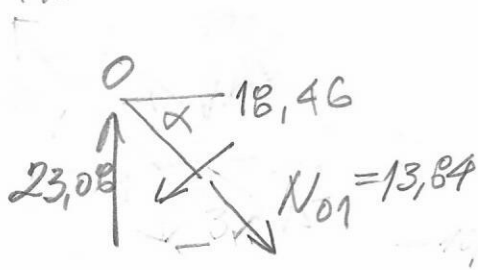
$$EJ \delta_{22} = \frac{5}{3} \cdot 1^2 = 1,6$$

$$EJ \delta_{10} = EJ \delta_{20} = \frac{5}{3} \cdot 1 \cdot (-20) = -33,3$$



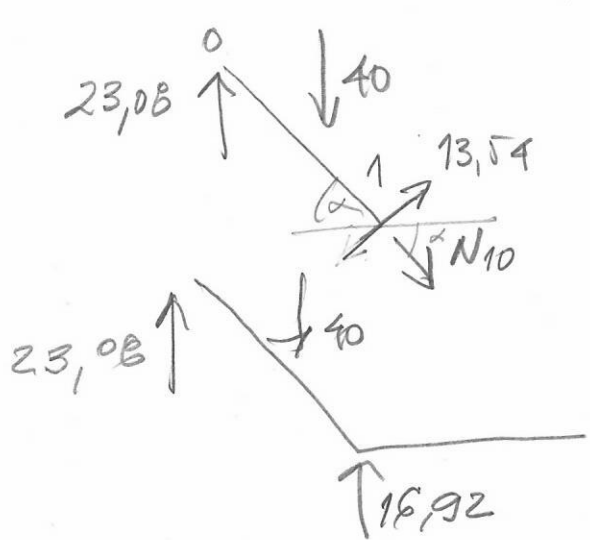
$$T_{01} = \frac{17,44 - 5,13}{5} + \frac{4 \cdot 20}{5} = 18,46 \text{ kN}$$

$$T_{10} = \frac{17,44 - 5,13 - 4 \cdot 20}{5} = -13,54 \text{ kN}$$



$$V_0 = 20 + 0,25(17,44 - 5,13) = 23,08$$

$$N_{01} \cdot 0,8 - 18,46 \cdot 0,6 = 0 \Rightarrow N_{01} = 13,84$$

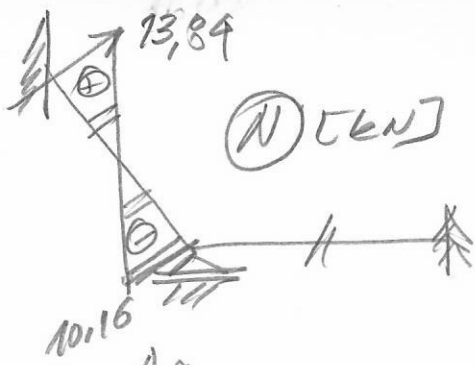


$$N_{10} \cdot 0,8 + 13,54 \cdot 0,6 = 0 \Rightarrow N_{10} = 10,16$$

$$V_1 = 20 + 0,25(5,13 - 17,44) = 16,92$$

$$\Sigma V = 16,92 + 23,08 - 40 = 0$$

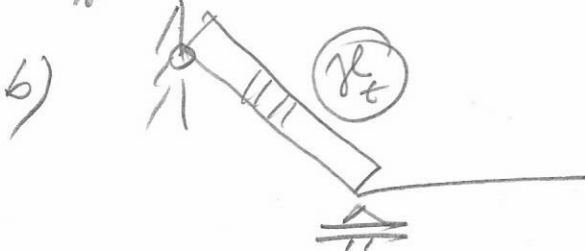
$$0 = 0 \checkmark$$



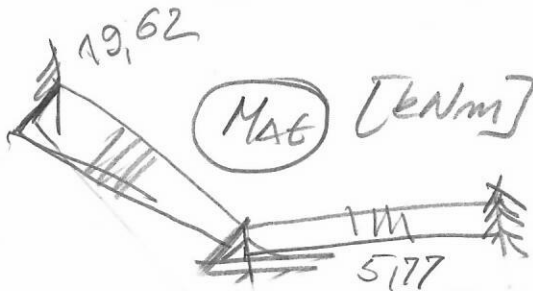
$N$  [kN]

$$EJ \delta_{1at} = 30 \cdot 10^3 \cdot 1 \cdot 10 \cdot \frac{-5 \cdot 20}{2A} \cdot 1 \cdot \frac{5}{2}$$

$$= 375 = EJ \delta_{2at}$$



$$X_1 = -5,77 \quad X_2 = -19,62 \text{ kNm}$$



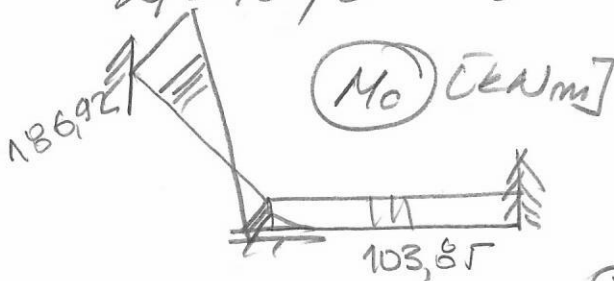
$M_{at}$  [kNm]

c)

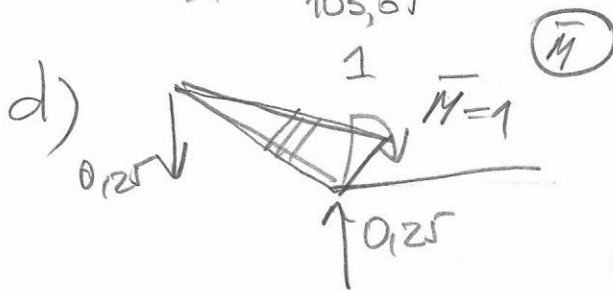
$$EJ \delta_{1c} = -30 \cdot 10^3 \cdot 0,25 \cdot (-0,03) = 225$$

$$EJ \delta_{2c} = -30 \cdot 10^3 \cdot 0,25 \cdot 0,03 = -225$$

$$X_1 = -103,85 \quad X_2 = 186,92$$



$M_c$  [kNm]

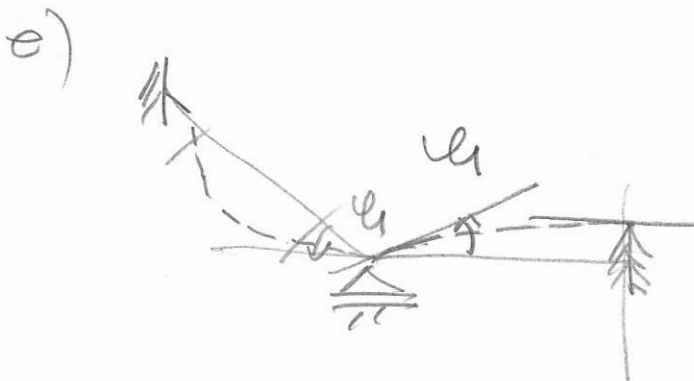


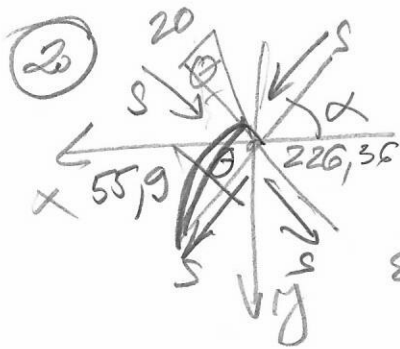
$\bar{M}$

$$EJ \varphi_1 = \frac{5}{6} 1 (2 \cdot 5,13 + 17,44) +$$

$$- \frac{5}{3} \cdot 1 \cdot 20 = -10,25$$

$$\varphi_1 = \frac{-10,25 \cdot 10^{-3}}{30} = -341,6 \cdot 10^{-6} \text{ rad}$$





$$l = \sqrt{20^2 + 10^2} = 22,36 \text{ cm}$$

$$\operatorname{tg} \alpha = \frac{20}{10}$$

$$\cos \alpha = 0,447 \sim$$

$$\sin \alpha = 0,894$$

$$J_x = 4 \cdot 1 \cdot \frac{22,36^3}{3} \cdot 20 = 11925,70 \text{ cm}^4$$

$$S_{x,OT} = 1 \cdot \frac{22,36}{2} \cdot (-15) = -167,7 \text{ cm}^3$$

$$\tilde{S}_{x,T} = 1 \cdot 22,36 \cdot (-10) = -223,6 \text{ cm}^3$$

$$\tau_{25,T} = \frac{-30 \cdot 10^{-3} \cdot (-223,6) \cdot 10^{-6}}{11925,70 \cdot 10^{-8} \cdot 10 \cdot 10^{-2}} = 0,025 \cdot 223,6 = 5,625 \text{ MPa}$$

$$\tau_{25,OT} = 0,025 \cdot 55,9 = 1,406 \text{ MPa}$$

$$S = 1 \cdot 22,36 \cdot 10^{-4} \cdot \left( \frac{5,625}{2} + \frac{2}{3} \cdot 1,406 \right) \cdot 10^3 = 8,384 \text{ kN}$$

$$\sum V = 30 - 4 \cdot 8,384 \cdot 0,894 = 0$$

$$0,00 = 0 \checkmark$$

$S(0;0)$  ZBOG „ZVEZDASTOG“ PRESJKA