

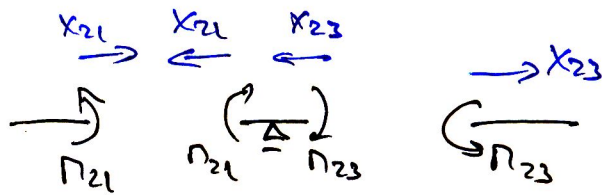
$$EI = 24 \text{ MNm}^2$$

$$EA = 96 \text{ MN}$$

$$\alpha = 12 \cdot 10^{-6} \text{ K}^{-1}$$

$$h = 0,6 \text{ m}$$

verschiebung? $\rightarrow u_2$
 φ_2



$$(1) P_{21} + P_{23} = 0$$

$$(2) X_{21} + X_{23} = 0$$

$$\bullet M_{21} = k_{12} \cdot \left(2\varphi_2 + \frac{3 \cdot 10}{3} \right) = 32\varphi_2 + 160 = 95,616 \text{ kNm}$$

$$\downarrow \frac{2 \cdot 24}{3} = 16$$

$$\bullet M_{23} = \frac{3}{2} \frac{EI}{h} \alpha_T \Delta t + \frac{3k_{23}}{2} \left(\varphi_2 + \frac{0 - 10}{4} \right) =$$

$$= \frac{3}{2} \cdot \frac{24000}{0,6} \cdot 12 \cdot 10^{-6} \cdot (-20) + \frac{3 \cdot 24}{4} (\varphi_2 - 2,5) = -95,616 \text{ kNm}$$

$$= -14,4 + 18\varphi_2 - 45 = 18\varphi_2 - 59,4$$

$$\bullet X_{21} = m_{12} \cdot u_2 = \frac{96}{3} u_2 = 32u_2 = -13,152 \text{ kN}$$

$$\bullet X_{23} = EA \alpha_T \Delta T_2 + m_{23} u_2 = 96000 \cdot 12 \cdot 10^{-6} \cdot 20 + \frac{96}{4} u_2 = 23,04 + 24u_2 = 13,176 \text{ kN}$$

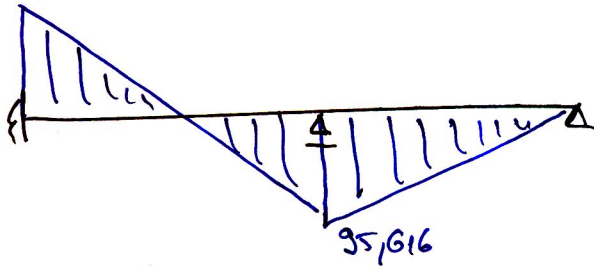
Bestimme die Verschiebung (und die Kräfte) numerisch:

$$(1) 32\varphi_2 + 18\varphi_2 + 160 - 59,4 = 0 \rightarrow \varphi_2 = -2,012 \text{ mrad}$$

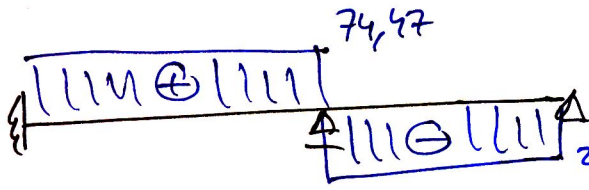
$$(2) 32u_2 + 24u_2 + 23,04 = 0 \rightarrow u_2 = -0,411 \text{ mm}$$

$$\bullet M_{12} = k_{12} \cdot \left(\varphi_2 + \frac{3 \cdot 10}{3} \right) = 16\varphi_2 + 160 = 127,828 \text{ kNm}$$

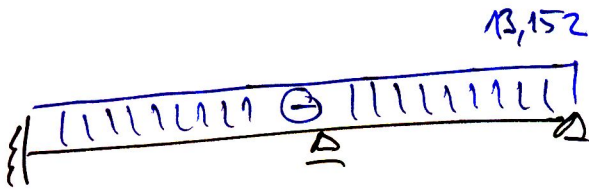
127,808



M [kNm]



V [kN]



N [kN]

