

Přítřadové konstrukce

Reakce:

$$\sum F_{zi} = 0 \Rightarrow R_{az} = F = 50 \text{ kN}$$

$$\sum M_{ai} = 0 \Rightarrow R_{ex} = 66,6 \text{ kN}$$

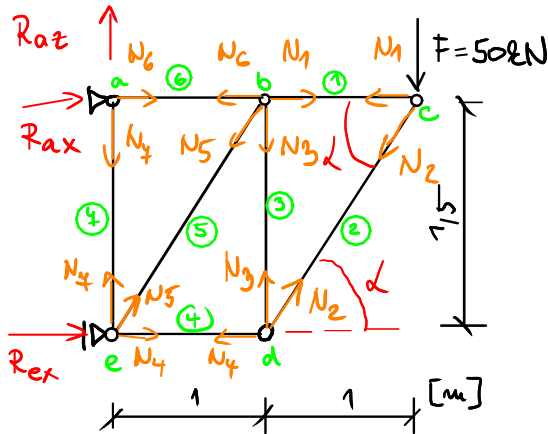
$$\sum M_{ei} = 0 \Rightarrow R_{ax} = -66,6 \text{ kN}$$

$$\text{kontrola: } \sum F_{xi} = 0 \quad 0 = 0 \checkmark$$

- síly ze styčnicku $\begin{cases} \oplus \text{ tah} \\ \ominus \text{ tlak} \end{cases}$

ZJEDNODUŠENÁ STYČNÍKOVÁ METODA

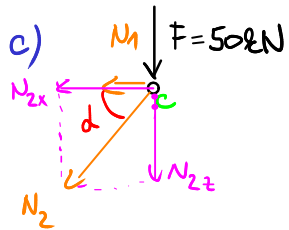
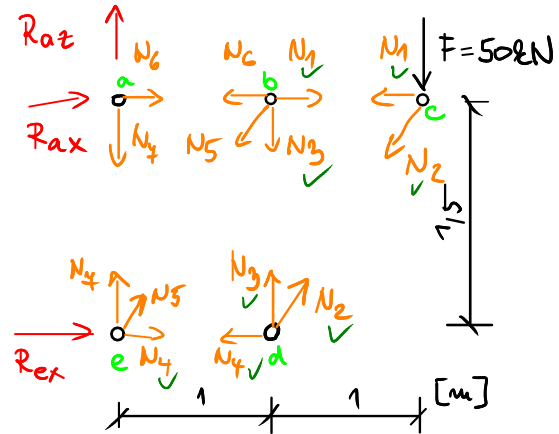
- začínáme od dvojného styčnicku



$$l_2 = \sqrt{1^2 + 1,5^2} = \frac{\sqrt{13}}{2}$$

$$\cos d = \frac{1}{l_2} = \frac{2}{\sqrt{13}}$$

$$\sin d = \frac{1,5}{l_2} = \frac{3}{\sqrt{13}}$$



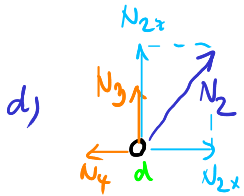
$$\sum F_{zi} = 0 \quad \oplus \downarrow \Rightarrow N_{2z} = -F = -50 \text{ kN}$$

$$F + N_{2z} = 0$$

$$F + N_2 \cdot \sin d = 0 \Rightarrow N_2 = -\frac{F}{\sin d} = -\frac{50}{\frac{3}{\sqrt{13}}} = -60,0925 \text{ kN (tlak)}$$

$$\sum F_{xi} = 0 \quad \oplus \leftarrow$$

$$N_{2x} + N_1 = 0 \Rightarrow N_1 = -N_{2x} = -N_2 \cos d = -(-60,0925) \cdot \frac{2}{\sqrt{13}} = 33,13 \text{ kN (tah)}$$

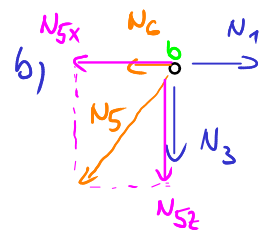


$$\sum F_{xi} = 0 \quad \oplus \rightarrow$$

$$N_{2x} - N_4 = 0 \Rightarrow N_4 = N_{2x} = N_2 \cos d = -33,13 \text{ kN (tlak)}$$

$$\sum F_{zi} = 0 \quad \oplus \uparrow$$

$$N_3 + N_{2z} = 0 \rightarrow N_3 = -N_{2z} = -N_2 \sin d = 50 \text{ kN (tah)}$$



$$\sum F_{zi} = 0 \quad \oplus \downarrow$$

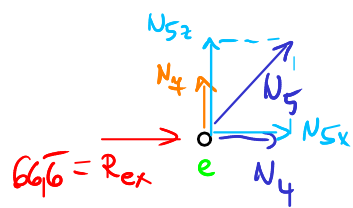
$$N_3 + N_{5z} = 0 \Rightarrow N_3 + N_5 \sin d = 0$$

$$N_5 = -\frac{N_3}{\sin d} = -\frac{50}{\frac{3}{\sqrt{13}}} = -60,0925 \text{ kN (tlak)}$$

$$\sum F_{xi} = 0 \quad \oplus \leftarrow$$

$$N_{5x} + N_6 - N_1 = 0 \Rightarrow N_5 \cos d + N_6 - N_1 = 0$$

$$N_6 = N_1 - N_5 \cos d = 33,13 - (-60,0925) \cdot \frac{2}{\sqrt{13}} = 66,6 \text{ kN (tah)}$$



$$\sum F_{zi} = 0 \oplus \uparrow$$

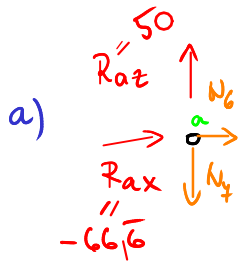
$$N_{5z} + N_4 = 0 \Rightarrow N_4 = -N_5 \cdot \sin \alpha = -(-6090925) \cdot \frac{3}{\sqrt{13}} = \underline{\underline{502\text{N}}} \quad (\text{tah})$$

KONTROLA: $\sum F_{xi} = 0 \oplus \rightarrow$

$$R_{ex} + N_{5x} + N_4 = 0$$

$$66\sqrt{6} + (-6090925) \cdot \frac{2}{\sqrt{13}} + (-33\sqrt{3}) = 0$$

$$\underline{\underline{0 = 0 \checkmark}}$$



$$\sum F_{xi} = 0 \oplus \rightarrow$$

$$R_{ax} + N_6 = 0$$

$$-66\sqrt{6} + 66\sqrt{6} = 0$$

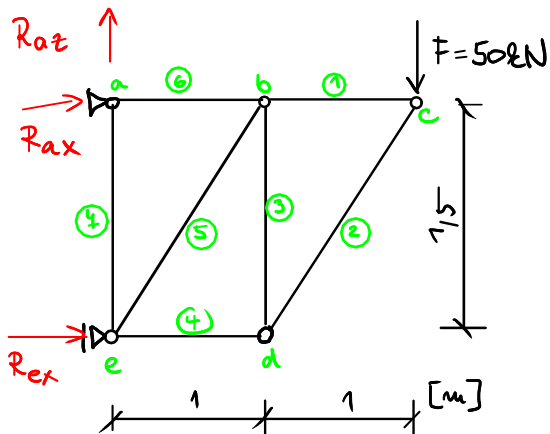
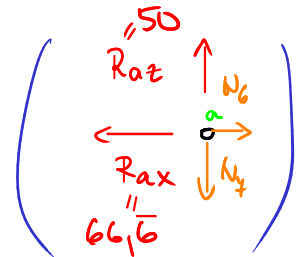
$$\underline{\underline{0 = 0 \checkmark}}$$

$$\sum F_{zi} = 0 \oplus \uparrow$$

$$R_{az} - N_4 = 0$$

$$50 - 50 = 0$$

$$\underline{\underline{0 = 0 \checkmark}}$$

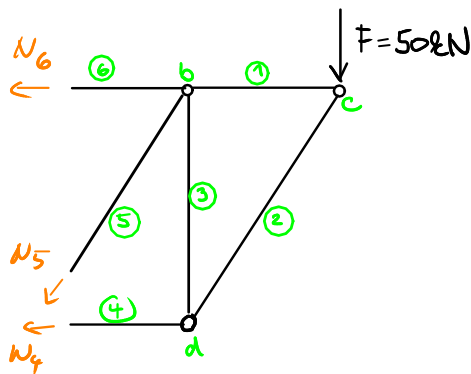
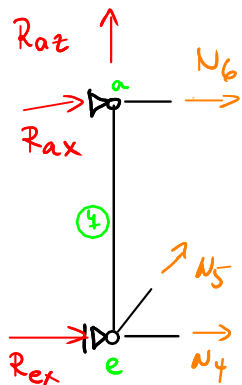


$$c \rightarrow d \rightarrow b \rightarrow e (\rightarrow a)$$

$$(a \rightarrow e \rightarrow d (\rightarrow c))$$

$$(a \rightarrow c \rightarrow d (\rightarrow b))$$

Průsečná metoda



$$\sum F_{xi} = 0$$

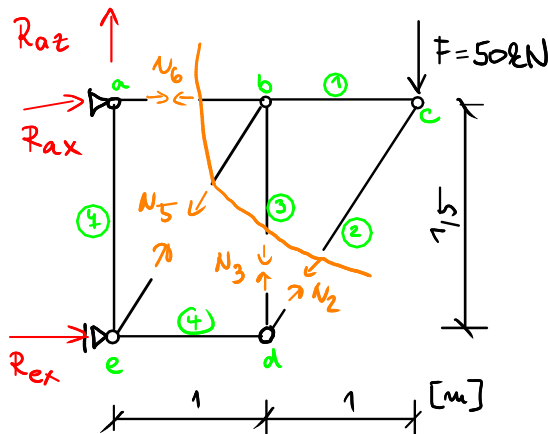
$$\sum F_{zi} = 0$$

$$\sum M_i = 0$$

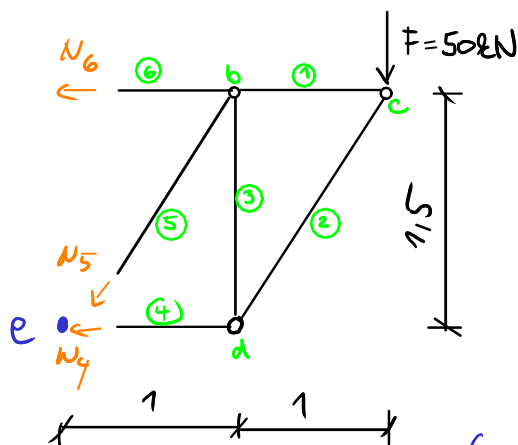
- řezu minimálně 3 pruty

průřez 1 prutu neprochází společným bodem

ostatní síly mají společný bod



Rittova úprava



$$\sum M_{bi} = 0 \quad (+\downarrow)$$

$$F \cdot 1 + N_4 \cdot 1,5 = 0$$

$$N_4 = -\frac{F}{1,5} = -\frac{50}{1,5} = -33,3 \text{ kN (tlak)}$$

$$\sum M_{ei} = 0 \quad (+\uparrow)$$

$$N_6 \cdot 1,5 - F \cdot 2 = 0$$

$$N_6 = \frac{50 \cdot 2}{1,5} = 66,6 \text{ kN (tah)}$$

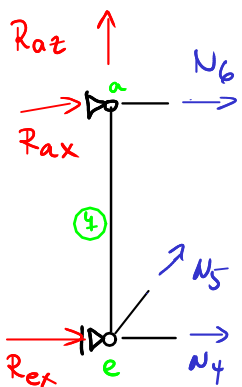
$$(N_4 \text{ a } N_6 = \infty)$$

momentová podmínka přechází na silovou $\perp$ na N_4 a N_6

$$\sum F_{zi} = 0 \quad (+\downarrow)$$

$$N_5 \sin \alpha + F = 0 \rightarrow N_5 \sin \alpha + F = 0$$

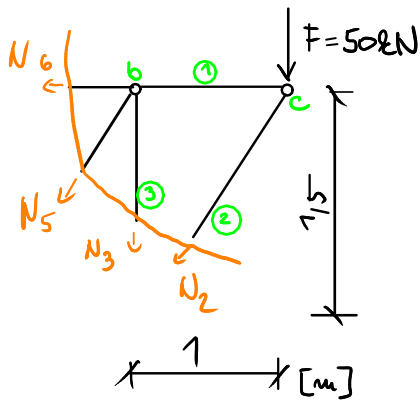
$$N_5 = -\frac{F}{\sin \alpha} = -\frac{50 \cdot \sqrt{3}}{3} = -60,0925 \text{ kN (tlak)}$$



kontrola: $\sum M_{bi} = 0$

$$\sum M_{ei} = 0$$

$$\sum F_{zi} = 0$$

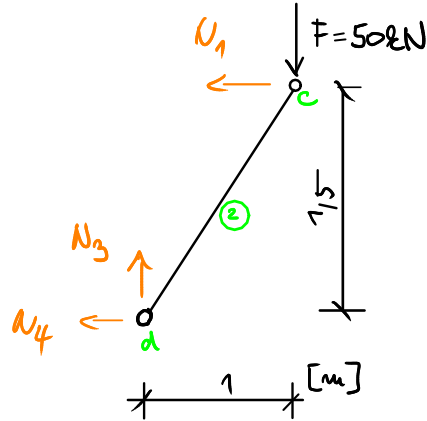
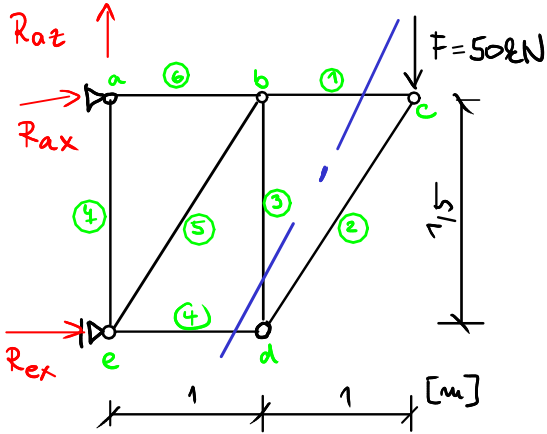


předpoklad N_3, N_5, N_6, N_2 neznáme

$$\sum M_{bi} = 0 \oplus \downarrow$$

$$F \cdot 1 + N_{22} \cdot 1 = 0$$

$$N_2 \sin \alpha = -\frac{F}{\sin \alpha} = -\frac{50 \sqrt{3}}{3} = -60,0925 \text{ kN} \quad (\text{tlak})$$



$$\sum M_{di} = 0 \oplus \uparrow$$

$$N_1 \cdot 1,5 - F \cdot 1 = 0$$

$$N_1 = \frac{F}{1,5} = 33,33 \text{ kN} \quad (\text{tah})$$

$$\sum F_{zi} = 0 \oplus \uparrow \quad (\text{tah})$$

$$N_3 - F = 0 \Rightarrow N_3 = 50 \text{ kN}$$

- N_1 33,3
- N_2 -60,0925
- N_3 50
- N_4 -33,3
- N_5 -60,0925
- N_6 66,6
- N_7 50

