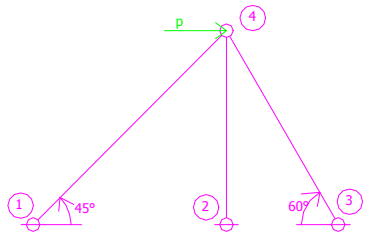
Odredite sile u štapovima



P = 100kN
E = 2.1x10^8 kN/m^2
F = 12.3 x 10^{-4} m^2
EF = 25.83 x 10^4 kN

nepoznanice: u, v (komponente pomaka čvora 4)

$$S_i = \frac{E_i \cdot F_i}{l_i}\Delta l_i = \frac{E_i \cdot F_i}{l_i}\left(u \cdot \cos\alpha_i + v \cdot \sin\alpha_i\right)$$

-jednadžbe ravnoteže čvora: $\Sigma Fx = 0$, $\Sigma Fy = 0$

$$P - S_1 \cos 45^\circ + S_3 \cos 60^\circ = 0$$
$$S_2 + S_1 \sin 45^\circ + S_3 \sin 60^\circ = 0$$

$$EF \cdot u' = u$$
$$EF \cdot v' = v$$

$$100 - \frac{\sqrt{2}}{2} \cdot \frac{EF}{2\sqrt{2}}\left(u' \cdot \cos 45^\circ + v' \sin 45^\circ\right) + \frac{1}{2} \cdot \frac{EF}{2{,}31}\left(u' \cdot \cos 120^\circ + v' \cdot \sin 120^\circ\right) = 0$$

$$\frac{EF}{2}\left(u' \cdot \cos 90^\circ + v' \sin 90^\circ\right) + \frac{\sqrt{2}}{2} \cdot \frac{EF}{2\sqrt{2}}\left(u' \cdot \cos 45^\circ + v' \sin 45^\circ\right) + 0{,}866 \cdot \frac{EF}{2{,}31}\left(u' \cdot \cos 120^\circ + v' \sin 120^\circ\right) = 0$$

$$-0{,}285 \cdot u + 0{,}01067 \cdot v = -100$$
$$-0{,}0107 \cdot u + 1{,}002 \cdot v = 0$$

$$u = 351{,}02$$
$$v = 3{,}76$$

$$S_1 = \frac{1}{2\sqrt{2}}\left(\frac{\sqrt{2}}{2}\cdot 351{,}02 + \frac{\sqrt{2}}{2}\cdot 3{,}76\right) = 88{,}44\text{kN}$$

$$S_2 = \frac{1}{2}\left(0\cdot 351{,}02 + 1\cdot 3{,}76\right) = 1{,}88\text{kN}$$

$$S_3 = \frac{1}{2{,}31}\left(351{,}02\cdot\cos 120 + 3{,}76\cdot\sin 120\right) = -74{,}6\text{kN}$$

Pretpostavili smo vlačne sile pa pozitivan predznak izračunatih vrijednosti sila u štapovima označava vlak, a negativan tlak.