

H virtuelle, eingeprägte Hilfskraft

Lagerreaktionen:

Kräftebilanzen

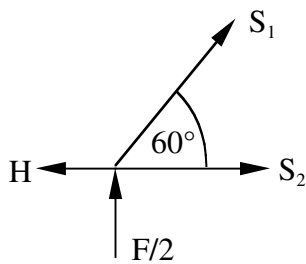
$$\begin{aligned} \rightarrow x: & \quad H - F_{Ax} = 0 \\ \uparrow y: & \quad F_{Ay} + F_{By} - F = 0 \end{aligned}$$

Momentenbilanz

$$A) \quad -aF + 2aF_{By} = 0 \qquad F_{By} = F_{Ay} = \frac{F}{2} \qquad F_{Ax} = H$$

Symmetrie $S_3 = S_5$ $S_2 = S_6$ $S_1 = S_7$

Knotenpunktverfahren:

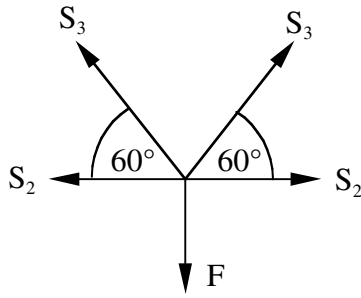


$$\rightarrow x: \quad -H + S_2 + S_1 \cos 60^\circ = 0$$

$$\uparrow y: \quad S_1 \sin 60^\circ + \frac{F}{2} = 0$$

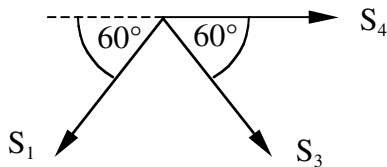
$$S_1 = -\frac{F}{\sqrt{3}} = -2.89 \text{ kN}$$

$$S_2 = H + \frac{F}{2\sqrt{3}} = 1.44 \text{ kN} \Big|_{H \rightarrow 0}$$



$$\uparrow y: \quad 2S_3 \sin 60^\circ - F = 0$$

$$S_3 = \frac{F}{\sqrt{3}} = 2.89 \text{ kN}$$



$$\rightarrow x: \quad S_4 + S_3 \cos 60^\circ - S_1 \cos 60^\circ = 0$$

$$S_4 = -\frac{F}{\sqrt{3}} = -2.89 \text{ kN}$$

Satz von Castigliano:

$$u = \lim_{H \rightarrow 0} \sum_{i=1}^7 \frac{l S_i(F, H)}{EA} \frac{\partial S_i(F, H)}{\partial H}$$

$$\frac{\partial S_i(F, H)}{\partial H} \neq 0 \text{ für } S_2, S_6$$

$$u = \frac{2l S_2}{EA} = \frac{Fl}{\sqrt{3}EA} = 0.28 \text{ mm}$$