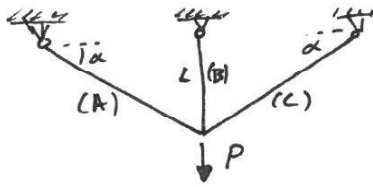


2.2.14

Fachwerk  
 x Tvärsnittarean A x Lin. el. modul E x Längd L på stång B

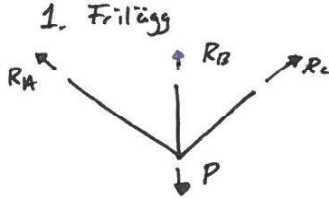
Givet



Sökt Stångkrafter

$N_A$   $N_B$   $N_C$

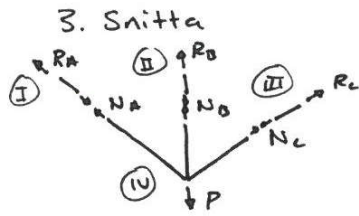
Lösning



2. Jmv

$$\uparrow: -P + R_B + R_A \cdot \sin \alpha + R_C \cdot \sin \alpha = 0 \Rightarrow R_A \cdot \sin \alpha + R_C \cdot \sin \alpha + R_B = P$$

$$\rightarrow: -R_A \cdot \cos \alpha + R_C \cdot \cos \alpha = 0 \Rightarrow R_A = R_C \quad (\text{kan ses utifrån symmetri})$$



4. Jmv

$$\text{I: } R_A - N_A = 0 \Rightarrow N_A = R_A$$

$$\text{II: } R_C - N_C = 0 \Rightarrow N_C = R_C$$

$$\text{III: } R_B - N_B = 0 \Rightarrow N_B = R_B$$

$$\text{IV: } \left\{ \begin{array}{l} P \text{ s.s. som i 2.} \\ \dots \end{array} \right.$$

$$\Rightarrow \frac{N_A \cdot \sin \alpha + N_B + N_C \cdot \sin \alpha = P}{N_A = N_C}$$

5. Normalspänning

$$\left[ \sigma = \frac{N}{A} \right] \quad \sigma_A = \frac{N_A}{A} \quad \sigma_B = \frac{N_B}{A} \quad \sigma_C = \frac{N_C}{A}$$

6. Konstitutiv samb

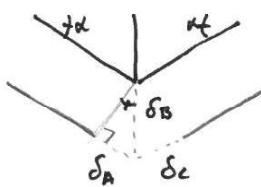
$$\left[ \sigma = E \epsilon \right] + \left[ \delta = \epsilon L \right] + \left[ \sigma = \frac{N}{A} \right] \Rightarrow \delta = \frac{NL}{EA}$$

$$\Rightarrow \delta_A = \frac{N_A L_A}{EA} \quad \delta_B = \frac{N_B L}{EA} \quad \delta_C = \frac{N_C L_C}{EA}$$

$$\left\{ L_A = L_C = \frac{L}{\sin \alpha} \right\} \rightarrow$$

7. Kompatibilitet

Deformationen kan ses som:



- pga symmetri är  $\delta_A = \delta_C$   
 och trigonometri/geometri för

$$\delta_A = \delta_B \cdot \sin \alpha$$

$$\delta_C = \delta_B \cdot \sin \alpha$$

$$\Rightarrow \text{dvs} \dots \frac{N_A \cdot \frac{L}{\sin \alpha}}{EA} = \frac{N_B \cdot L}{EA} \cdot \sin \alpha \Rightarrow N_A = N_C = N_B \cdot \sin^2 \alpha$$

$$\text{isatt jmv-sb: } N_B \cdot \sin^2 \alpha \cdot \sin \alpha + N_B + N_B \cdot \sin^2 \alpha \cdot \sin \alpha = P \Rightarrow N_B = \frac{P}{1 + 2 \sin^3 \alpha}$$

$$\text{och därmed } N_A = N_C = \frac{\sin^2 \alpha \cdot P}{1 + 2 \sin^3 \alpha}$$

Dim. ok!

$N_A, N_B, N_C > 0$  dvs dragande kraft ok!

Steg 1-2 kan givetvis slippas, då  
 gå direkt till snittning!