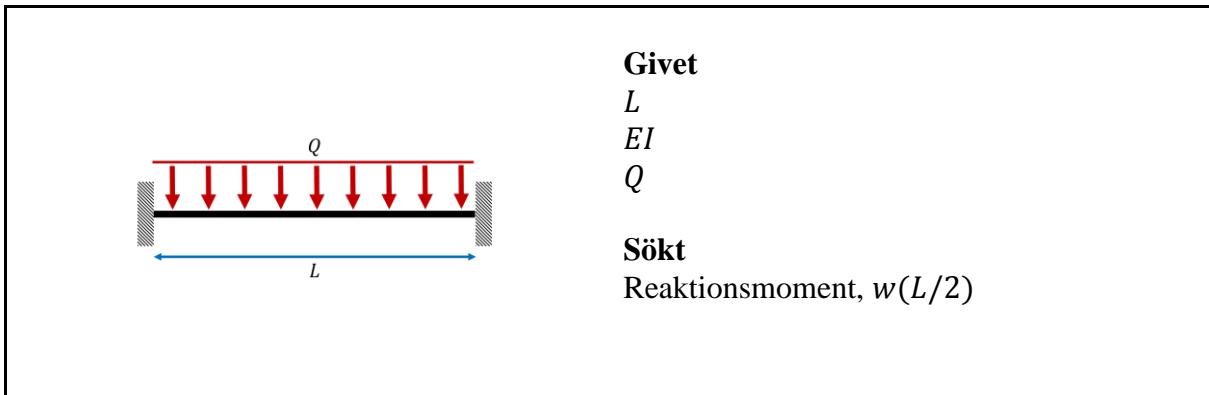
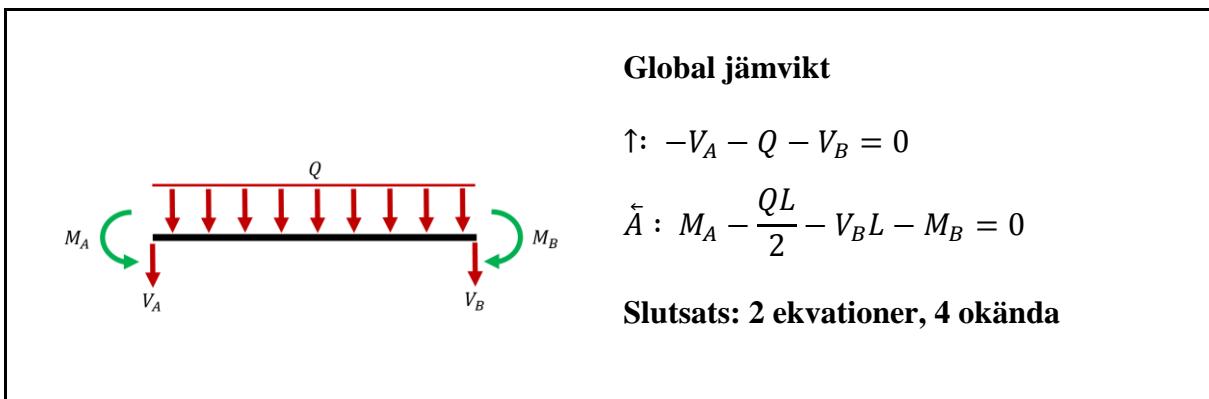


2.4.120 med elementarfall



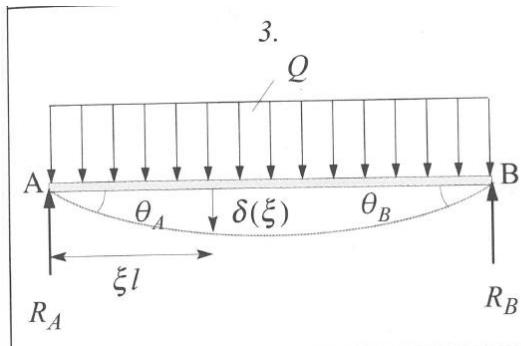
Lösning

Frilägg och inför reaktionskrafter och reaktionsmoment



1. Hitta elementarfall att kombinera

31.2.3



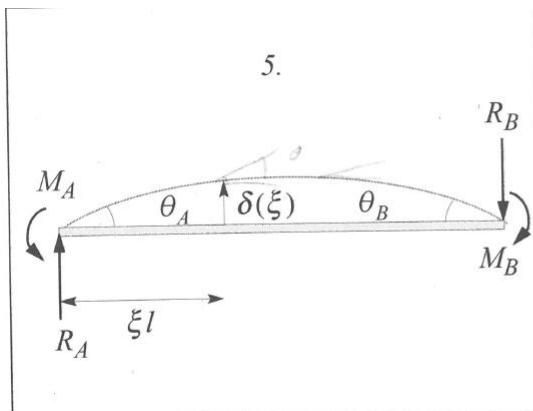
$$R_A = R_B = Q/2$$

$$\theta_A = \theta_B = \frac{Ql^2}{24EI}$$

$$\delta(\xi) = \frac{Ql^3}{24EI} (\xi - 2\xi^3 + \xi^4)$$

$$\delta\left(\frac{1}{2}\right) = \frac{5}{384} \cdot \frac{Ql^3}{EI}$$

31.2.5



$$R_A = R_B = (M_A - M_B)/l$$

$$\theta_A = \frac{M_A l}{3EI} + \frac{M_B l}{6EI} ; \quad \theta_B = \frac{M_A l}{6EI} + \frac{M_B l}{3EI}$$

$$\delta(\xi) = \frac{l^2}{6EI} [M_A(2\xi - 3\xi^2 + \xi^3) + M_B(\xi - \xi^3)]$$

$$M_A = M_B = M : \theta_A = \theta_B = \frac{Ml}{2EI};$$

$$\delta(\xi) = \frac{Ml^2}{2EI} (\xi - \xi^2)$$

2. Superponera de valda lastfallen.

Bestäm de två reaktionsmomenten via randvillkoret att vinkeln i kanten ska vara 0.

$$\theta_{tot}(0) = 0$$

$$\theta_{tot} = -\frac{QL^2}{24EI} + \frac{M_A L}{2EI}$$

$$0 = -\frac{QL^2}{24EI} + \frac{M_A L}{2EI}$$

$$M_A = \frac{QL}{12} = M_B$$

OK. Nu kan vi bestämma utböjningen på mitten

$$\delta_{tot} = -\delta_1 + \delta_2$$

$$\delta_{tot} \left(\xi = \frac{1}{2} \right) = -\frac{5QL^3}{384EI} + \frac{M_A L^2}{2EI} \left(\frac{1}{2} - \left(\frac{1}{2} \right)^2 \right)$$

$$\delta_{tot} \left(\xi = \frac{1}{2} \right) = -\frac{5QL^3}{384EI} + \frac{QL}{12} \cdot \frac{L^2}{2EI} \cdot \frac{1}{4}$$

$$\delta_{tot} \left(\xi = \frac{1}{2} \right) = -\frac{5QL^3}{384EI} + \frac{QL^3}{96EI}$$

$$\delta_{tot} \left(\xi = \frac{1}{2} \right) = -\frac{QL^3}{384EI}$$

Reaktionskrafter

$$R_{A,tot} = R_{A1} + R_{A2} = \frac{Q}{2} + \frac{(M_A - M_B)}{L}$$

$$R_{A,tot} = \frac{Q}{2}$$

Via symmetri

$$R_{B,tot} = \frac{Q}{2}$$