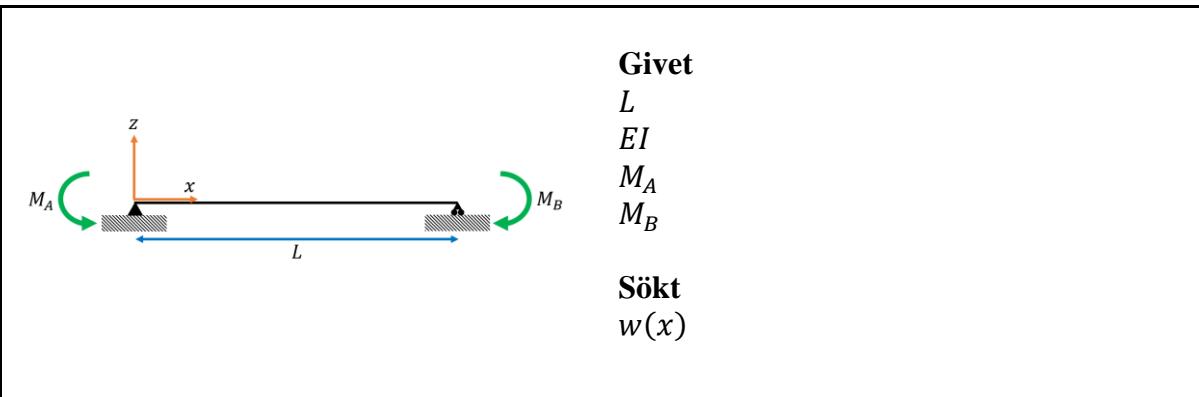


2.4.97



Lösning

Använd elastiska linjens ekvation

$$\{\text{FS 6.20}\}$$

$$[EIw''(x)]'' = q(x)$$

Integrera 4 gånger för att få utböjning $w(x)$

$$EIw'''(x) = C_1$$

$$EIw''(x) = C_1x + C_2$$

$$EIw'(x) = \frac{C_1x^2}{2} + C_2x + C_3$$

$$EIw(x) = \frac{C_1x^3}{6} + \frac{C_2x^2}{2} + C_3x + C_4$$

C_1, C_2, C_3, C_4 måste bestämmas med hjälp av randvillkor.

**MOMENTEN BETECKNAS SOM POSITIVA OM DE ORSAKAR EN "SUR MUN"
DVS UTBÖJNING UPPÅT**

$$(I) \quad w(0) = 0$$

$$(II) \quad w(L) = 0$$

$$(III) \quad EIw''(0) = -M_A$$

$$(IV) \quad EIw''(L) = -M_B$$

Lös ut konstanterna

Villkor (I)

$$w(0) = 0 = \frac{1}{EI} \left(\frac{\mathcal{C}_1 0^3}{6} + \frac{\mathcal{C}_2 0^2}{2} + \mathcal{C}_3 0 + \mathcal{C}_4 \right)$$

$$\mathcal{C}_4 = 0$$

Villkor (III)

$$EIw''(0) = -M_A = \mathcal{C}_1 0 + \mathcal{C}_2$$

$$\mathcal{C}_2 = -M_A$$

Villkor (IV)

$$EIw''(L) = -M_B = \mathcal{C}_1 L - M_A$$

$$\mathcal{C}_1 = \frac{M_A - M_B}{L}$$

Villkor (II)

$$w(L) = 0 = \frac{(M_A - M_B)}{L} \frac{L^3}{6} + \frac{-M_A L^2}{2} + \mathcal{C}_3 L$$

$$0 = \frac{M_A L^2}{6} - \frac{M_B L^2}{6} - \frac{M_A L^2}{2} + \mathcal{C}_3 L$$

$$\mathcal{C}_3 = \frac{M_B L}{6} + \frac{M_A L}{3}$$

Sätt ihop allt

$$w(x) = \frac{1}{EI} \left(\frac{(M_A - M_B)}{L} \frac{x^3}{6} - \frac{M_A x^2}{2} + \left(\frac{M_A}{3} + \frac{M_B}{6} \right) L x \right)$$