

Diethard Thieme

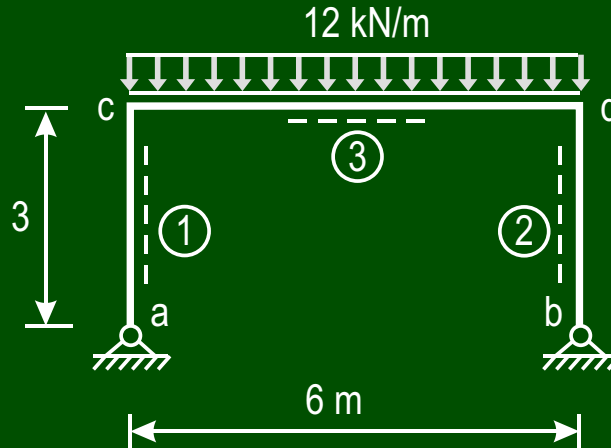
Übungen

zur

Baustatik

BS 05

DIE AUFGABEN IN BM46 UND BS03 GERECHNET ?



Kennwerte

$$J_3 = 150\,000 \text{ cm}^4 ; J_1 = J_2 = 1,2 J_3$$

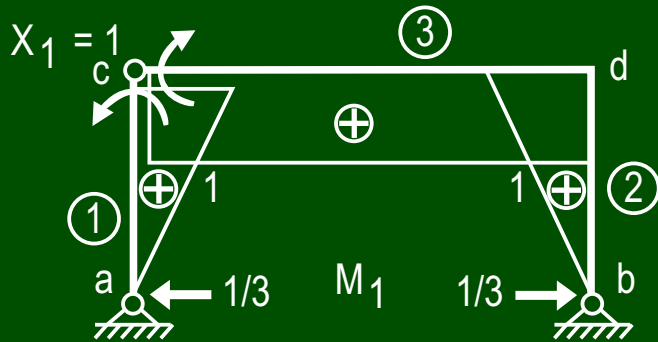
$$E_1 = E_2 = E_3 = 3 \cdot 10^7 \text{ kN/m}^2$$

$$\text{Gewählt: } J_0 = J_1 ; E_0 = E_1$$

Reduzierte Stablängen

$$L'_1 = L_1 \frac{E_0 J_0}{E_1 J_1} = 3 \frac{1}{1} \frac{1}{1} = 3 \text{ m}$$

$$L'_2 = 3 \text{ m} ; L'_3 = 7,2 \text{ m}$$



$$L'_1 = 3 ; L'_2 = 3 ; L'_3 = 7,2$$

$$a = E_0 J_0 1 \cdot \delta$$

Belastungszahl

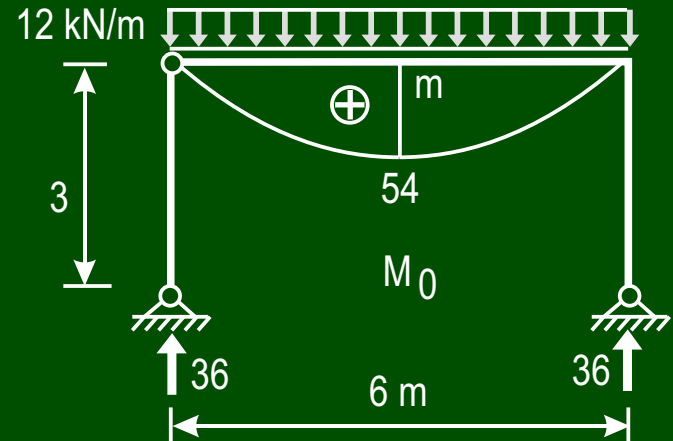
$$a_{10} = 7,2 \cdot \frac{2}{3} \cdot 1 \cdot 54 = 259,2$$

Vorzahl

$$a_{11} = 3 \cdot \frac{1}{3} \cdot 1 \cdot 1 + 7,2 \cdot 1 \cdot 1 + 3 \cdot \frac{1}{3} \cdot 1 \cdot 1 = 9,2$$

Gleichung

$$a_{11} X_1 = -a_{10} \text{ daraus } X_1 = -28,2$$



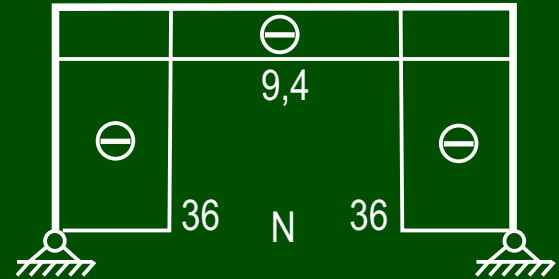
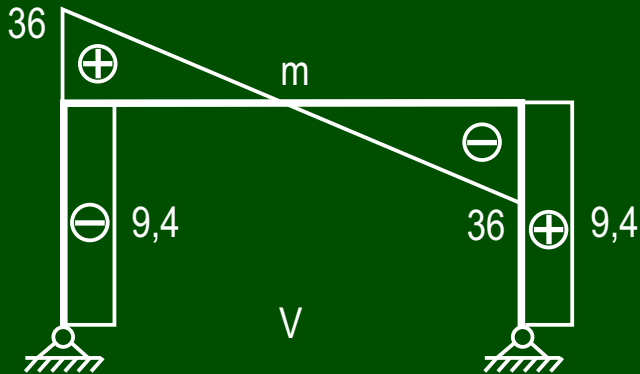
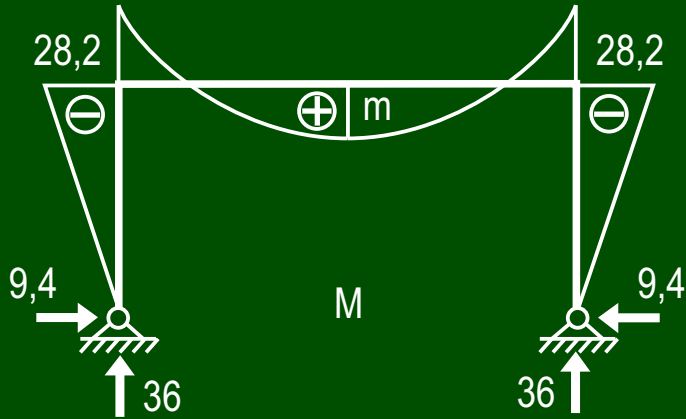
Superposition

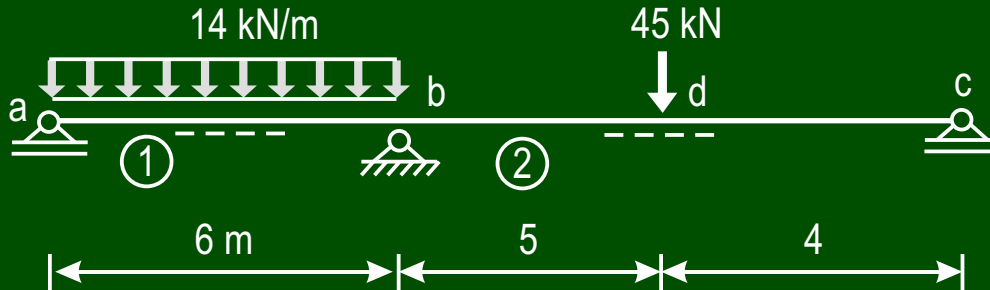
$$M_m = M_{m,0} + X_1 M_{m,1}$$

$$M_m = 54 + (-28,2) \cdot 1 = 25,8 \text{ kNm}$$

$$M_c = -28,2$$

$$M_d = -28,2$$





Kennwerte

$$J_1 = 100\,000 \text{ cm}^4 ; J_2 = 1,5 J_1$$

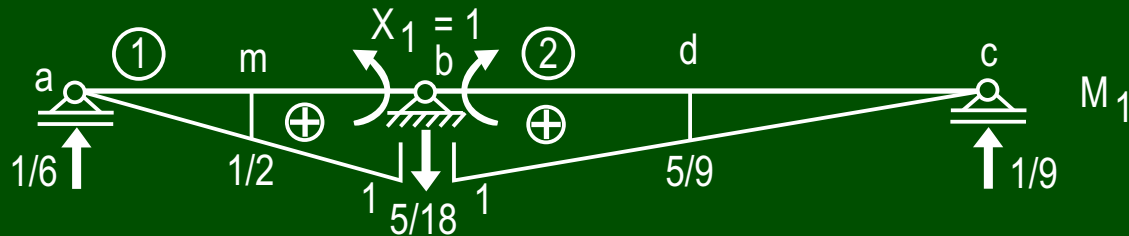
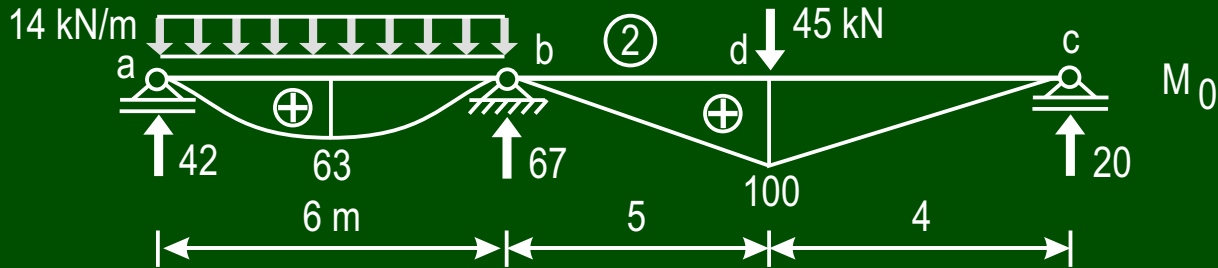
$$E_1 = E_2 = 3 \cdot 10^7 \text{ kN/m}^2$$

$$\text{Gewählt: } J_0 = J_2 ; E_0 = E_1$$

Reduzierte Stablängen

$$L'_1 = L_1 \frac{E_0 J_0}{E_1 J_1} = L_1 \frac{E_1 J_2}{E_1 J_1} = 6 \frac{1}{1} \frac{1,5}{1} = 9 \text{ m}$$

$$L'_2 = 9 \text{ m}$$



$$L'_1 = 9 ; L'_2 = 9$$

$$a_{10} = 9 \frac{1}{3} \cdot 1 \cdot 63 + 9 \frac{1}{6} \cdot 1 \cdot 100 \left(1 + \frac{5}{9}\right) = 422,3$$

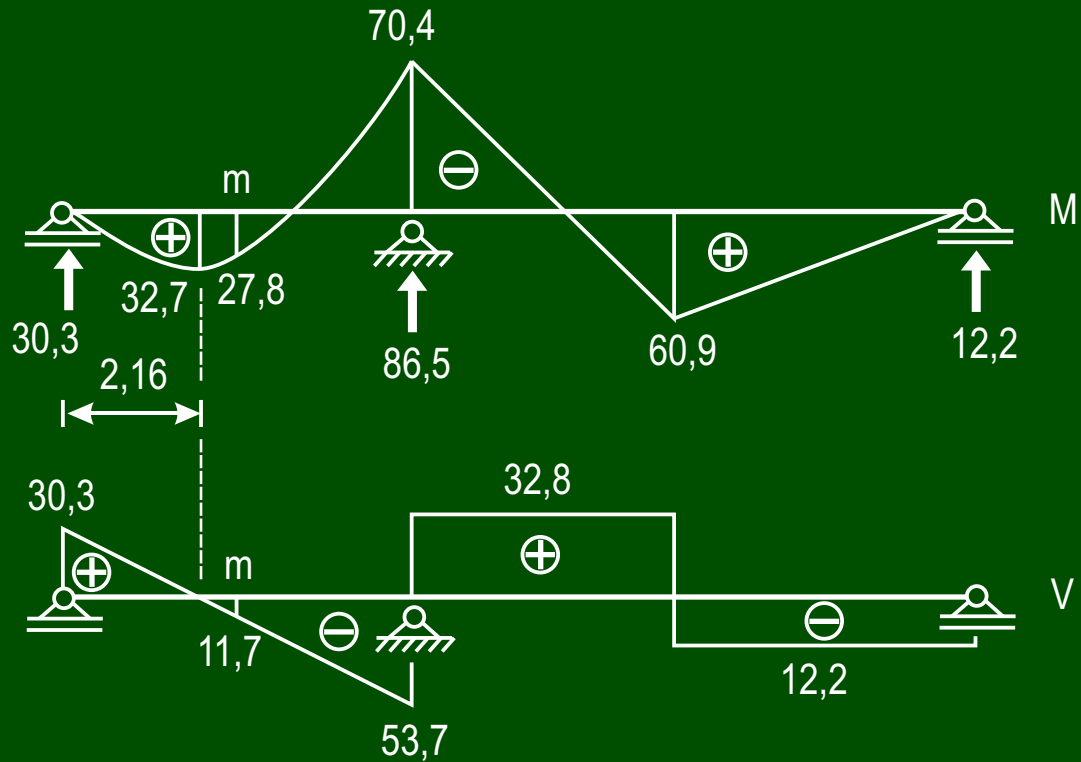
$$a_{11} = 9 \frac{1}{3} \cdot 1 \cdot 1 + 9 \frac{1}{3} \cdot 1 \cdot 1 = 6$$

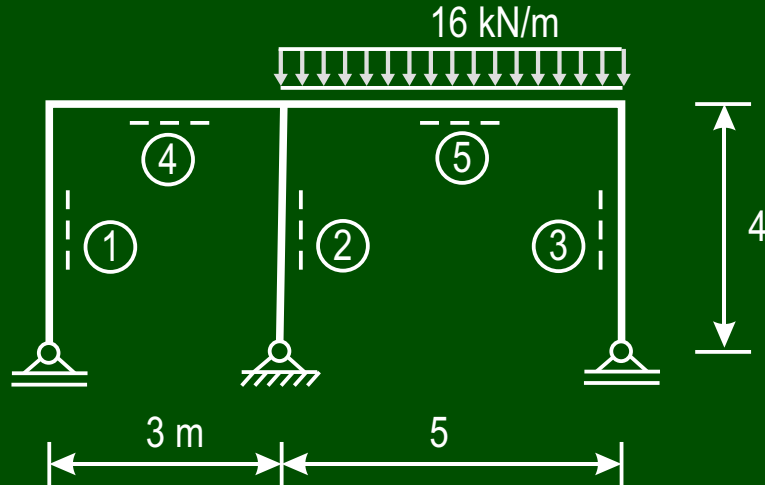
$$a_{11} X_1 = -a_{10} \text{ daraus } X_1 = -70,4$$

$$M_m = 63 + (-70,4) \frac{1}{2} = 27,8 \text{ kNm}$$

$$M_b = -70,4$$

$$M_d = -60,9$$





Kennwerte

$$J_1 = J_2 = J_3 = 160\,000 \text{ cm}^4$$

$$J_4 = J_5 = 200\,000 \text{ cm}^4$$

$$E_1 \dots E_5 = 3 \cdot 10^7 \text{ kN/m}^2$$

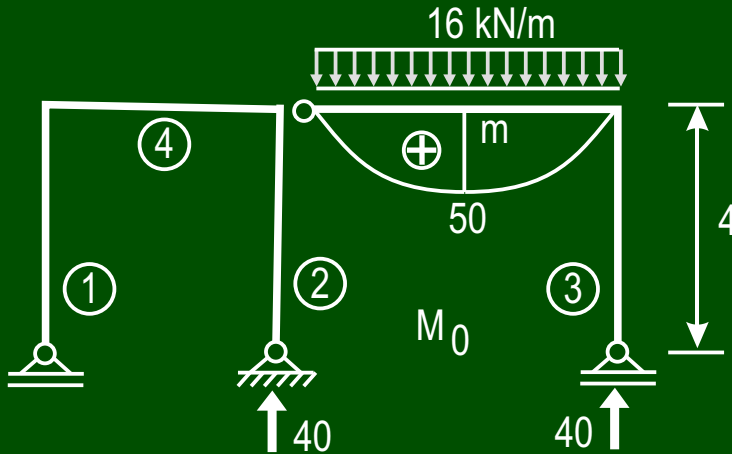
$$\text{Gewählt: } J_0 = J_1 ; E_0 = E_1$$

Reduzierte Stablängen

$$L'_1 = L'_2 = L'_3 = 4 \frac{1}{1} \frac{1}{1} = 4 \text{ m}$$

$$L'_4 = 3 \frac{1}{1} \frac{0,8}{1} = 2,4 \text{ m}$$

$$L'_5 = 5 \frac{1}{1} \frac{0,8}{1} = 4 \text{ m}$$



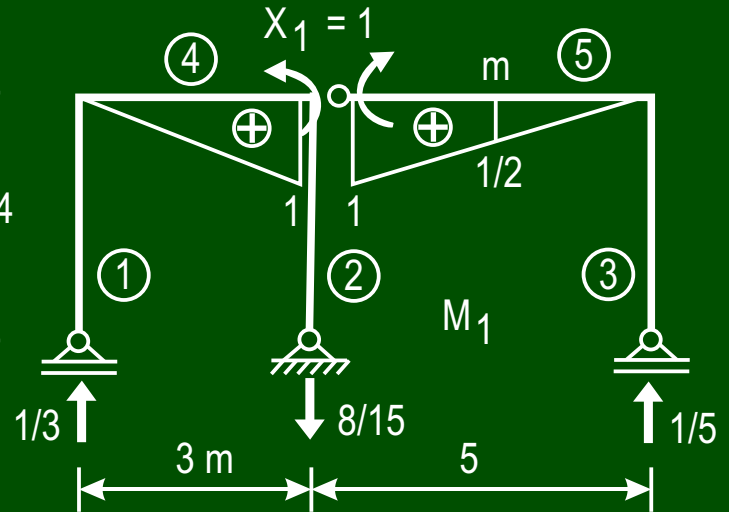
$$L'_1 = L'_2 = L'_3 = 4 ; L'_4 = 2,4 ; L'_5 = 4$$

$$a = E_0 J_0 1^* \delta$$

$$a_{10} = 4 \frac{1}{3} 1 \cdot 50 = 66,7$$

$$a_{11} = 2,4 \frac{1}{3} 1 \cdot 1 + 4 \frac{1}{3} 1 \cdot 1 = 2,13$$

$$a_{11} X_1 = -a_{10} \text{ daraus } X_1 = -31,3$$



Superposition

$$M_m = M_{m,0} + X_1 M_{m,1}$$

$$M_m = 50 + (-31,3) \frac{1}{2} = 34,4$$

