Dankert/Dankert: Technische Mechanik, 5. Auflage
Lösungen zu den Aufgaben, Teil 2 (Kapitel 7)

Lösung 7.1:

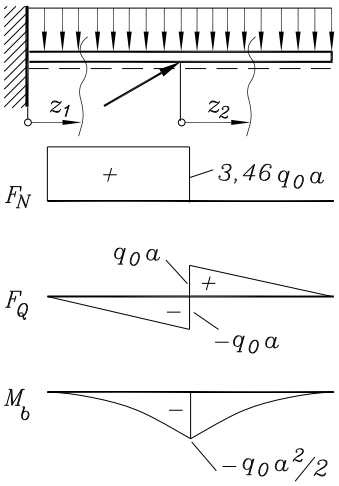
a)

$$F_{AH} = 3{,}46\, q_0 a \;;$$
$$F_{AV} = 0 \;;$$
$$M_A = 0 \;;$$

b)

$$F_{N1} = 3{,}46\, q_0 a \;;$$
$$F_{N2} = 0 \;;$$
$$F_{Q1} = -q_0 z_1 \;;$$
$$F_{Q2} = q_0 (a - z_2) \;;$$
$$M_{b1} = -0{,}5\, q_0 z_1^2 \;;$$
$$M_{b2} = -0{,}5\, q_0 (a - z_2)^2 \;.$$

c)



Lösung 7.2:

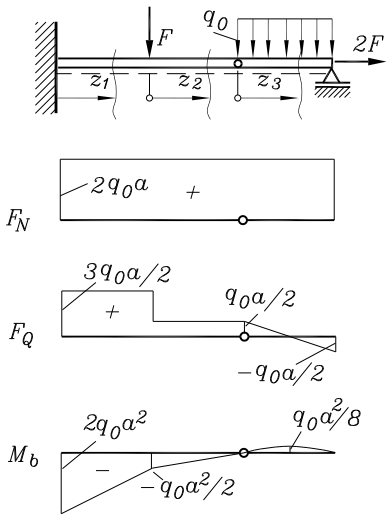
a)

$$F_{N1} = 2\, q_0 a \;;$$
$$F_{N2} = 2\, q_0 a \;;$$
$$F_{N3} = 2\, q_0 a \;;$$

$$F_{Q1} = 1{,}5 q_0 a \;;$$
$$F_{Q2} = 0{,}5 q_0 a \;;$$
$$F_{Q3} = 0{,}5 q_0 a \left(1 - 2\,\frac{z_3}{a}\right) \;;$$

$$M_{b1} = 0{,}5\, q_0 a^2 \left(-4 + 3\,\frac{z_1}{a}\right) \;;$$
$$M_{b2} = 0{,}5\, q_0 a^2 \left(-1 + \frac{z_2}{a}\right) \;;$$
$$M_{b3} = 0{,}5\, q_0 a^2 \left[\frac{z_3}{a} - \left(\frac{z_3}{a}\right)^2\right] \;.$$

b)

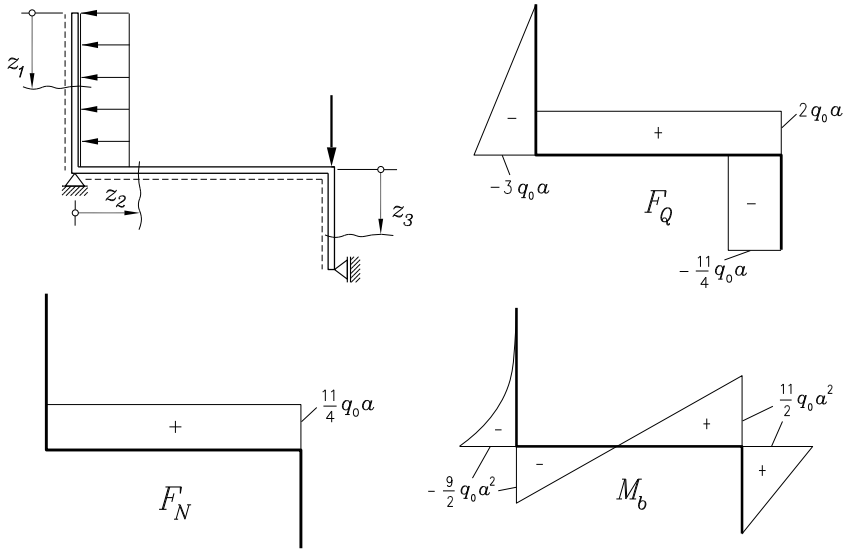


c) $|M_b|_{max} = 2 q_0 a^2$ an der Einspannstelle A.

Lösung 7.3: *a)* $F_{AH} = 0,25\,q_0 a$; $F_{AV} = 2\,q_0 a$; $F_B = 2,75\,q_0 a$;

b)
$$F_{N1} = 0 \;; \qquad F_{Q1} = -\,q_0 z_1 \;; \qquad M_{b1} = -0,5\,q_0 z_1^2 \;;$$
$$F_{N2} = 2,75\,q_0 a \;; \qquad F_{Q2} = 2 q_0 a \;; \qquad M_{b2} = -0,5\,q_0 a^2 \left(9 - 4\frac{z_2}{a}\right) \;;$$
$$F_{N3} = 0 \;; \qquad F_{Q3} = -2,75 q_0 a \;; \qquad M_{b3} = 2,75\,q_0 a^2 \left(2 - \frac{z_3}{a}\right) \;.$$

c)

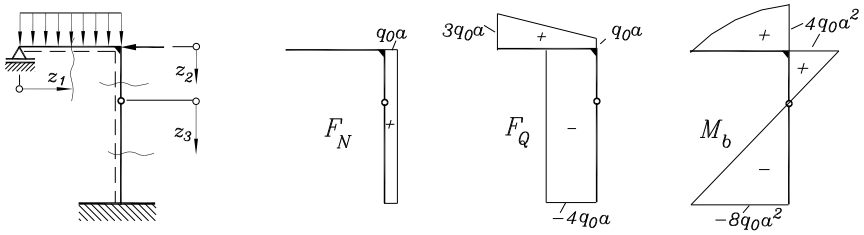


d) $|M_b|_{max} = 5,5 q_0 a^2$ am Angriffspunkt der Einzelkraft.

Lösung 7.4: *a)* $F_A = 3\,q_0 a$; $F_{BH} = 4\,q_0 a$; $F_{BV} = q_0 a$; $M_B = 8\,q_0 a^2$;

b)
$$F_{N1} = 0 \;; \qquad F_{Q1} = q_0 a \left(3 - \frac{z_1}{a}\right) \;; \qquad M_{b1} = 0,5\,q_0 a^2 \left[6\frac{z_1}{a} - \left(\frac{z_1}{a}\right)^2\right] \;;$$
$$F_{N2} = q_0 a \;; \qquad F_{Q2} = -4 q_0 a \;; \qquad M_{b2} = 4\,q_0 a^2 \left(1 - \frac{z_2}{a}\right) \;;$$
$$F_{N3} = q_0 a \;; \qquad F_{Q3} = -4 q_0 a \;; \qquad M_{b3} = -4\,q_0 a z_3 \;.$$

c)

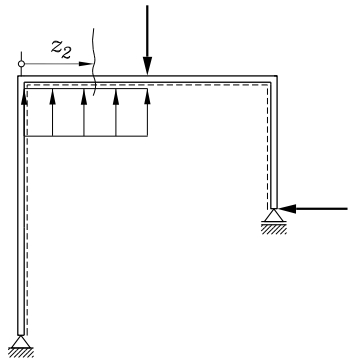


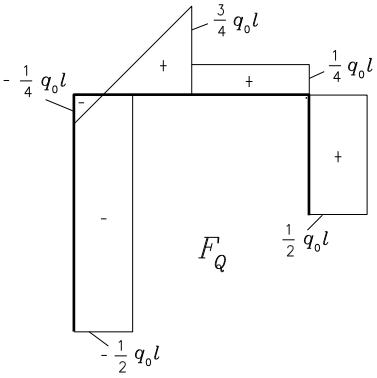
d) $|M_b|_{max} = 8 q_0 a^2$ an der Einspannung (Punkt B).

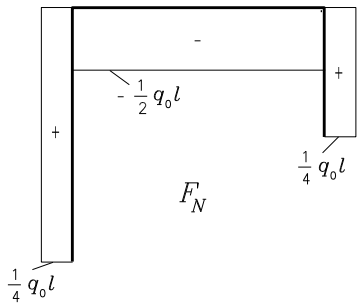
Lösung 7.5: *a*) $F_{AH} = 0,5\,q_0 l \;;\; F_{AV} = 0,25\,q_0 l \;;\; F_B = 0,25\,q_0 l \;;$

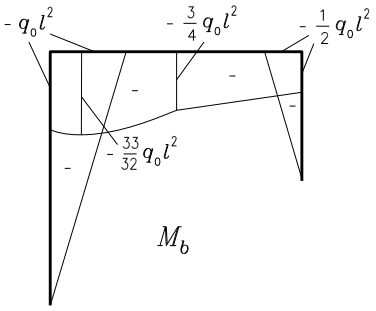
b) $F_{N2} = -0,5\,q_0 l \;;\; F_{Q2} = -\dfrac{q_0 l}{4}\left(1 - 4\,\dfrac{z_2}{l}\right) \;;\; M_{b2} = -\dfrac{q_0 l^2}{4}\left[4 + \dfrac{z_2}{l} - 2\left(\dfrac{z_2}{l}\right)^2\right] .$

c)









d) $|M_b|_{max} = \frac{33}{32} q_0 l^2$ bei $z_2 = \frac{1}{4}\,l.$