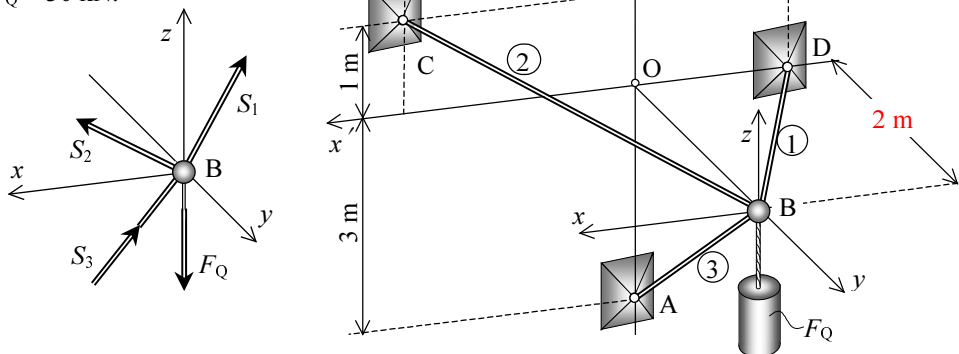


**Primjer 4.1**

Za sustav zadan prema slici odrediti sile u štapovima BD, BC i AB. Zadano:  $F_Q = 30$  kN.



Slika uz primjer 4.1

**Rješenje:**

Duljine štapova su:  $\overline{BD} = 2\sqrt{2}$  m,  $\overline{BC} = \sqrt{14}$  m,  $\overline{AB} = \sqrt{13}$  m.

Ovdje se radi o konkurentnom skupu sila u prostoru te se sile u štapovima (koje se sve pretpostavljaju vlačne) mogu izračunati postavljanjem triju jednadžbi ravnoteže:

$$\sum F_x = 0, \quad -S_{1x} + S_{2x} = 0, \quad \frac{2}{2\sqrt{2}}S_1 = \frac{3}{\sqrt{14}}S_2, \quad S_1 = \frac{3\sqrt{2}}{\sqrt{14}}S_2,$$

$$\sum F_y = 0, \quad -S_{1y} + S_{2y} - S_{3y} = 0, \quad -\frac{2}{2\sqrt{2}}S_1 - \frac{2}{\sqrt{14}}S_2 - \frac{2}{\sqrt{13}}S_3 = 0,$$

$$\sum F_z = 0, \quad -S_{2z} - S_{3z} - F_Q = 0, \quad \frac{1}{\sqrt{14}}S_2 - \frac{3}{\sqrt{13}}S_3 - F_Q = 0,$$

$$S_3 = \frac{\sqrt{13}}{3} \cdot \left( -F_Q + \frac{S_2}{\sqrt{14}} \right).$$

Ako se izrazi  $S_1$  i  $S_3$  uvrste u jednadžbu 2) slijedi:

$$-\frac{1}{\sqrt{2}} \cdot \frac{3\sqrt{2}}{\sqrt{14}} \cdot S_2 - \frac{2}{\sqrt{14}} \cdot S_2 + \frac{2}{\sqrt{13}} \cdot \frac{\sqrt{13}}{3} \cdot \left( F_Q - \frac{S_2}{\sqrt{14}} \right) = 0,$$

$$S_2 = \frac{2\sqrt{14}}{17} \cdot 30, \quad S_2 = 13,21 \text{ kN}.$$

$$S_1 = \frac{3\sqrt{2}}{\sqrt{14}} \cdot \frac{2\sqrt{14}}{\sqrt{17}} \cdot F_Q = \frac{6\sqrt{2}}{17} \cdot 30, \quad S_1 = 14,95 \text{ kN}.$$

$$S_3 = -\frac{\sqrt{13}}{3} \cdot \left( F_Q - \frac{2\sqrt{14}}{17} F_Q \frac{1}{\sqrt{14}} \right) = -\frac{5\sqrt{13}}{\sqrt{17}} \cdot F_Q = -\frac{5\sqrt{13}}{17} \cdot 30, \quad S_3 = -31,81 \text{ kN}.$$