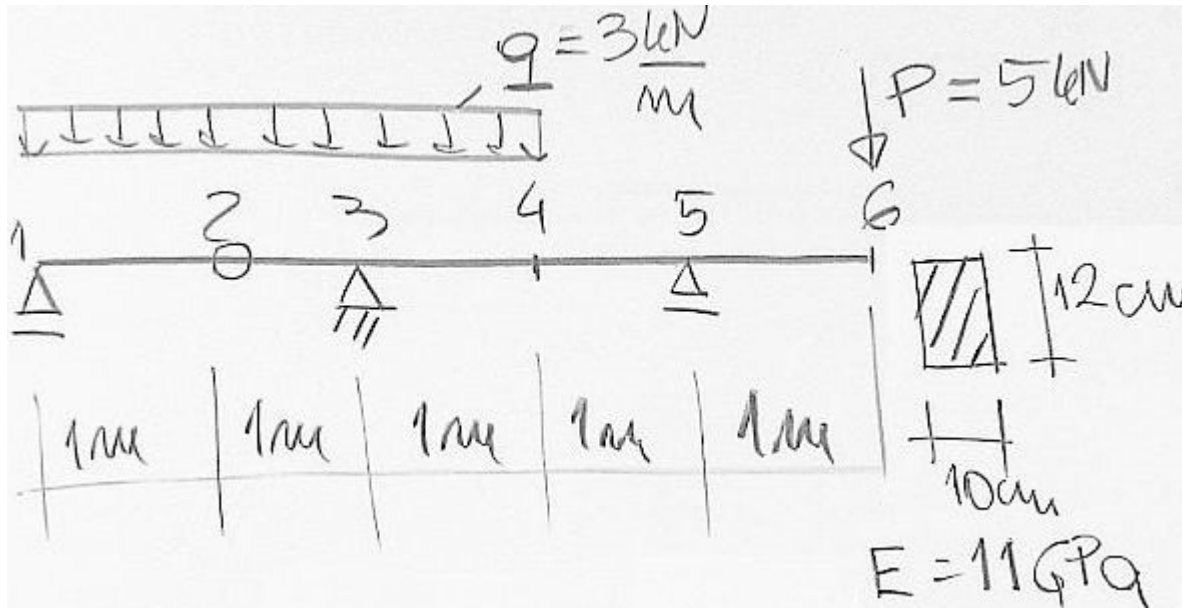


Metoda różnic skończonych - ugięcie belki



dokładność $\pm 0.005\text{mm}$

$$P := 5\text{ kN} \quad q := 3 \frac{\text{kN}}{\text{m}} \quad E := 11\text{ GPa}$$

$$b := 10\text{ cm} \quad h := 12\text{ cm}$$

$$L := 5\text{ m} \quad J := b \cdot \frac{h^3}{12} = 1440 \cdot \text{cm}^4$$

$$n := 5 \quad \Delta := \frac{L}{n} = 1\text{ m}$$

$$\alpha := \frac{\Delta^2}{E \cdot J} = 6.31313 \cdot \frac{1}{\text{MN}}$$

$$R1 := q \cdot \frac{1.0\text{ m}}{2} = 1.5 \cdot \text{kN}$$

$$T2 := R1$$

$$R5 := \frac{P \cdot 3\text{ m} - T2 \cdot 1\text{ m}}{2\text{ m}} = 6.75 \cdot \text{kN}$$

$$R3 := q \cdot 3\text{ m} + P - R1 - R5 = 5.75 \text{ kN}$$

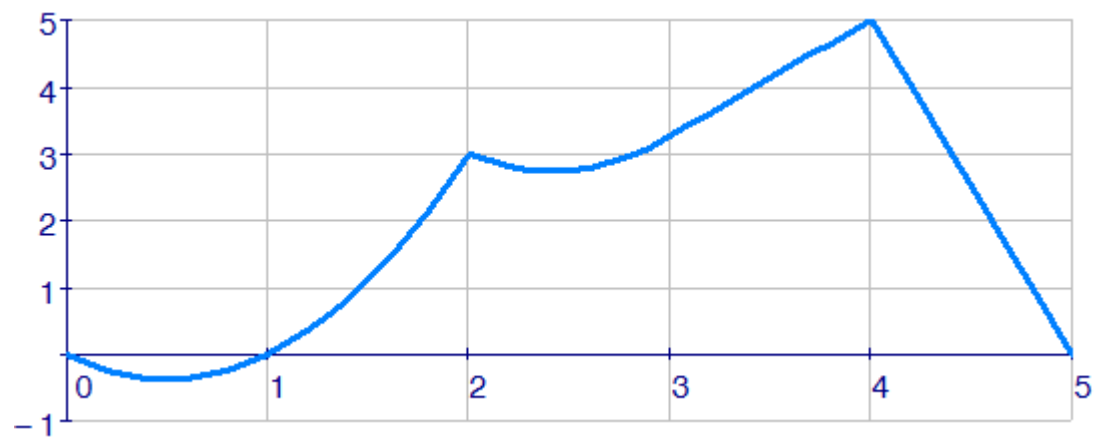
$$M1(x) := R1 \cdot x - q \cdot \frac{(x)^2}{2}$$

$$M2(x) := M1(x) + R3 \cdot (x - 2\text{ m})$$

$$M3(x) := M2(x) + q \cdot \frac{(x - 3\text{ m})^2}{2}$$

$$M4(x) := -P \cdot (L - x)$$

$$M = \begin{array}{c|c} & 1 \\ \hline 1 & 0.0000 \\ 2 & 0.0000 \\ 3 & -3.0000 \\ 4 & -3.2500 \\ 5 & -5.0000 \\ 6 & 0.0000 \end{array} \cdot \text{kN} \cdot \text{m} \quad X = \begin{array}{c|c} & 1 \\ \hline 1 & 0 \\ 2 & 1 \\ 3 & 2 \\ 4 & 3 \\ 5 & 4 \\ 6 & 5 \end{array} \text{ m}$$



Warunki brzegowe

$$y_1 = 0 \quad y_3 = 0 \quad y_5 = 0$$

$$\alpha = 6.31313 \cdot \frac{1}{\text{MN}}$$

Równania MRS

$$y_2 - 2y_3 + 4 = \alpha M_3$$

$$y_3 - 2y_4 + y_5 = \alpha M_4$$

$$y_4 - 2y_5 + y_6 = \alpha M_5$$

$$y = \begin{array}{c|c} & 1 \\ \hline 1 & 0.00 \\ 2 & -29.20 \\ 3 & 0.00 \\ 4 & 10.26 \\ 5 & 0.00 \\ 6 & -41.82 \end{array} \cdot \text{mm}$$