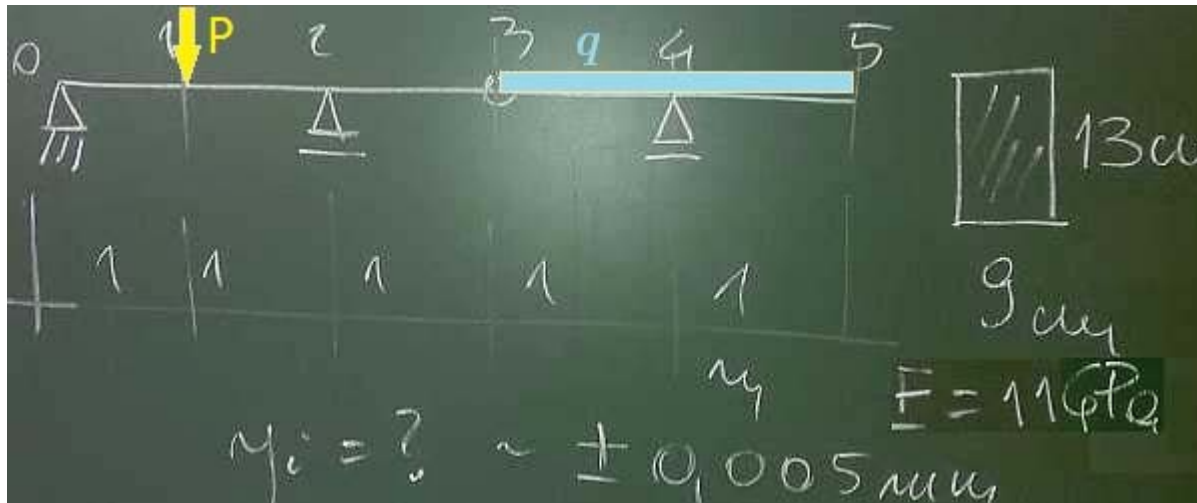


Metoda różnic skończonych - ugięcie belki



$$R_0 := \frac{P}{2} \quad R_2 := R_0 \quad R_4 := q \cdot 2\text{m}$$

$$M_1(x) := R_0 \cdot x \quad M_2(x) := M_1(x) - P \cdot (x - 1\text{m})$$

$$M_3(x) := M_2(x) + R_2 \cdot (x - 2\text{m})$$

$$M_4(x) := M_3(x) - q \cdot \frac{(x - 3\text{m})^2}{2}$$

$$M_5(x) := M_4(x) + R_4 \cdot (x - 4\text{m})$$

$$P := 3\text{ kN} \quad q := 2 \frac{\text{kN}}{\text{m}} \quad E := 11\text{ GPa}$$

$$b := 9\text{ cm} \quad h := 13\text{ cm}$$

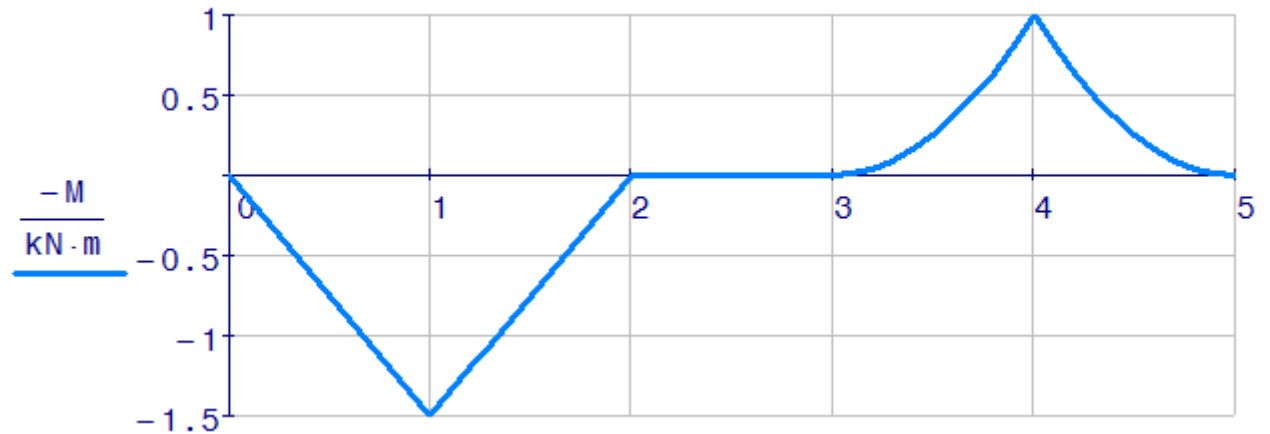
$$L := 5\text{ m} \quad J := b \cdot \frac{h^3}{12} = 1647.75 \cdot \text{cm}^4$$

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

$$\alpha := \frac{\Delta^2}{E \cdot J} = 5.51717 \cdot \frac{1}{\text{MN}}$$

dokładność $y \pm 0.005\text{ mm}$

$$M = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0 \\ \hline 1 & 1.5 \\ \hline 2 & 0 \\ \hline 3 & 0 \\ \hline 4 & -1 \\ \hline 5 & 0 \\ \hline \end{array} \cdot \text{kN} \cdot \text{m}$$

$$X = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0 \\ \hline 1 & 1 \\ \hline 2 & 2 \\ \hline 3 & 3 \\ \hline 4 & 4 \\ \hline 5 & 5 \\ \hline \end{array} \text{m}$$


Warunki brzegowe

$$y_0 = 0 \quad y_2 = 0 \quad y_4 = 0$$

$$\alpha = 5.51717 \cdot \frac{1}{\text{MN}}$$

Równania MRS

$$y_0 - 2y_1 + y_2 = \alpha M_1$$

$$y_1 - 2y_2 + y_3 = \alpha M_2$$

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

$$y = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0.00 \\ \hline 1 & -4.14 \\ \hline 2 & 0.00 \\ \hline 3 & 4.14 \\ \hline 4 & 0.00 \\ \hline 5 & -9.66 \\ \hline \end{array} \cdot \text{mm}$$

