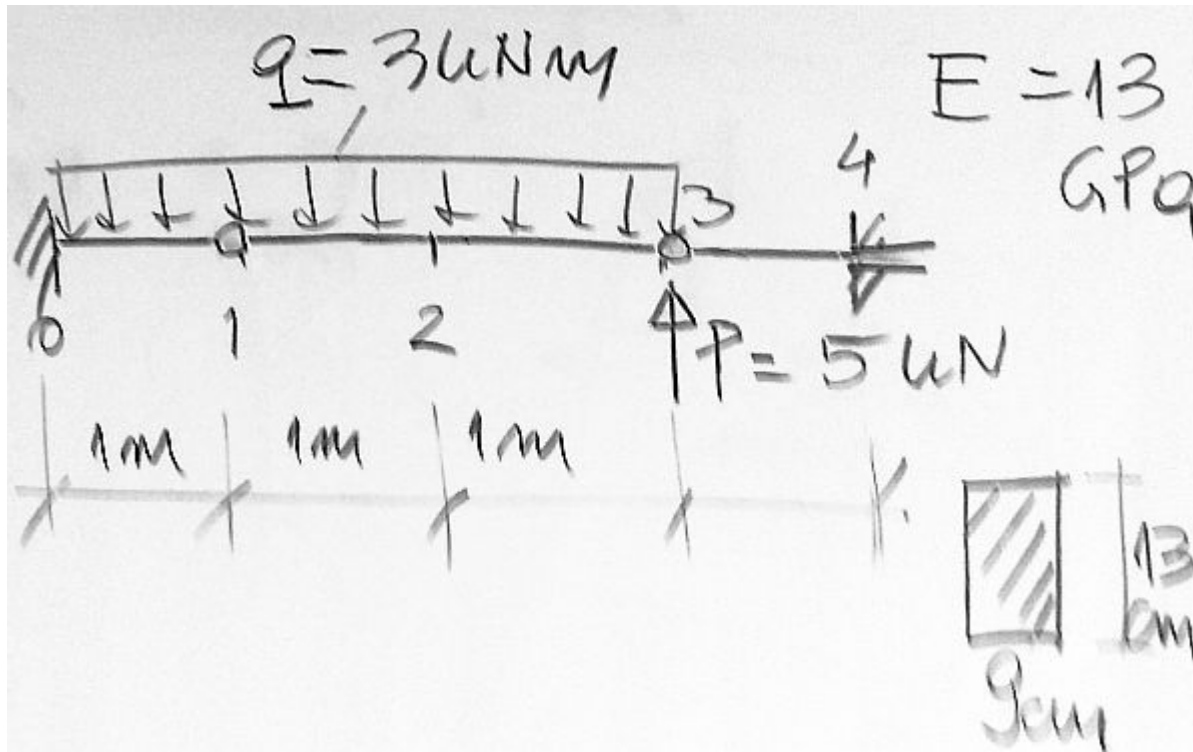


## Metoda różnic skończonych - ugięcie belki



$$P := 5 \text{ kN} \quad q := 3 \frac{\text{kN}}{\text{m}} \quad E := 13 \text{ GPa}$$

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

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

$$\Delta = 1 \text{ m}$$

$$\alpha := \frac{\Delta^2}{E \cdot J} = 4.66837 \cdot \frac{1}{\text{MN}}$$

$$\text{dokładność } y \pm 0.005 \text{ mm}$$

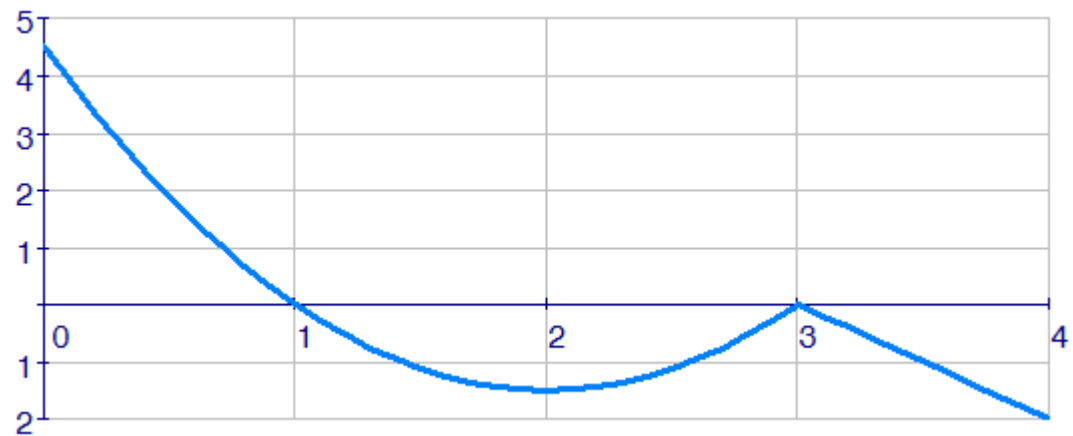
$$T1 := q \cdot 1 \text{ m}$$

$$M1(x) := -q \cdot \frac{(1 \text{ m} - x)^2}{2} - T1 \cdot (1 \text{ m} - x)$$

$$M2(x) := M1(x) + P \cdot (x - 3 \text{ m}) + q \cdot \frac{(x - 3 \text{ m})^2}{2}$$

$$M = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & -4.5 \\ \hline 1 & 0 \\ \hline 2 & 1.5 \\ \hline 3 & 0 \\ \hline 4 & 2 \\ \hline \end{array} \cdot \text{kN} \cdot \text{m}$$

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



*Warunki brzegowe*

$$y_0 = 0 \quad \varphi_0 = 0 \quad y_4 = 0 \quad \varphi_4 = 0$$

$$\alpha = 4.66837 \cdot \frac{1}{\text{MN}}$$

*Równania MRS*

$$2 y_1 = \alpha M_0$$

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

$$2 y_3 = \alpha M_4$$

$$y = \begin{array}{|c|c|} \hline & 0 \\ \hline 0 & 0.00 \\ \hline 1 & -10.50 \\ \hline 2 & -6.42 \\ \hline 3 & 4.67 \\ \hline 4 & 0.00 \\ \hline \end{array} \cdot \text{mm}$$

