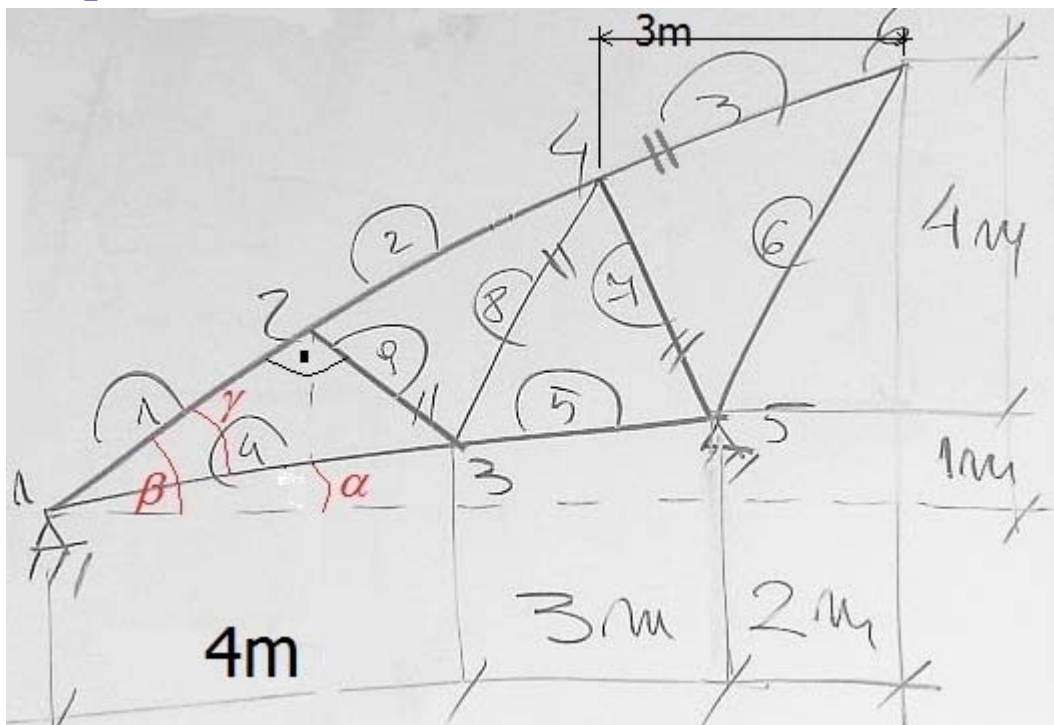


Macierze sztywności elementów kratownicy

Grupa 1 - wariant "b"



elementy := (3, 7, 8, 9)

EA := 28MN

$$\alpha := \operatorname{atan}\left(\frac{1}{7}\right) \quad \beta := \operatorname{atan}\left(\frac{5}{9}\right) \quad \gamma := \beta - \alpha$$

$$L4 := \sqrt{(4\text{m})^2 + \left(\frac{4}{7}1\text{m}\right)^2} = 4.04061\text{ m}$$

$$L1 := L4 \cdot \cos(\gamma) = 3.774139\text{ m}$$

$$X2 := L1 \cdot \cos(\beta) = 3.299191\text{ m}$$

$$Y2 := L1 \cdot \sin(\beta) = 1.832884\text{ m}$$

Element "3" - blok macierzy sztywności

$$L_x := 3\text{m}$$

$$L_y := \frac{3}{9} \cdot 5\text{m} = 1.666667\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 3.431877\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix}$$

$$J = \begin{pmatrix} 6235 & 3464 \\ 3464 & 1924 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "7" - blok macierzy sztywności

$$L_x := 1\text{m}$$

$$L_y := -\left(\frac{6}{9} \cdot 5\text{m} - 1\text{m}\right) = -2.333333\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 2.538591\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix}$$

$$J = \begin{pmatrix} 1712 & -3994 \\ -3994 & 9318 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "8" - blok macierzy sztywności

$$L_x := 2\text{m}$$

$$L_y := \frac{6}{9} \cdot 5\text{m} - \frac{4}{7} \cdot 1\text{m} = 2.761905\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 3.410003\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix}$$

$$J = \begin{pmatrix} 2825 & 3901 \\ 3901 & 5387 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "9" - blok macierzy sztywności

$$L_x := 4\text{m} - X2 = 0.700809\text{m}$$

$$L_y := \frac{4}{7} 1\text{m} - Y2 = -1.261456\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 1.443053\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix}$$

$$J = \begin{pmatrix} 4576 & -8237 \\ -8237 & 14827 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$