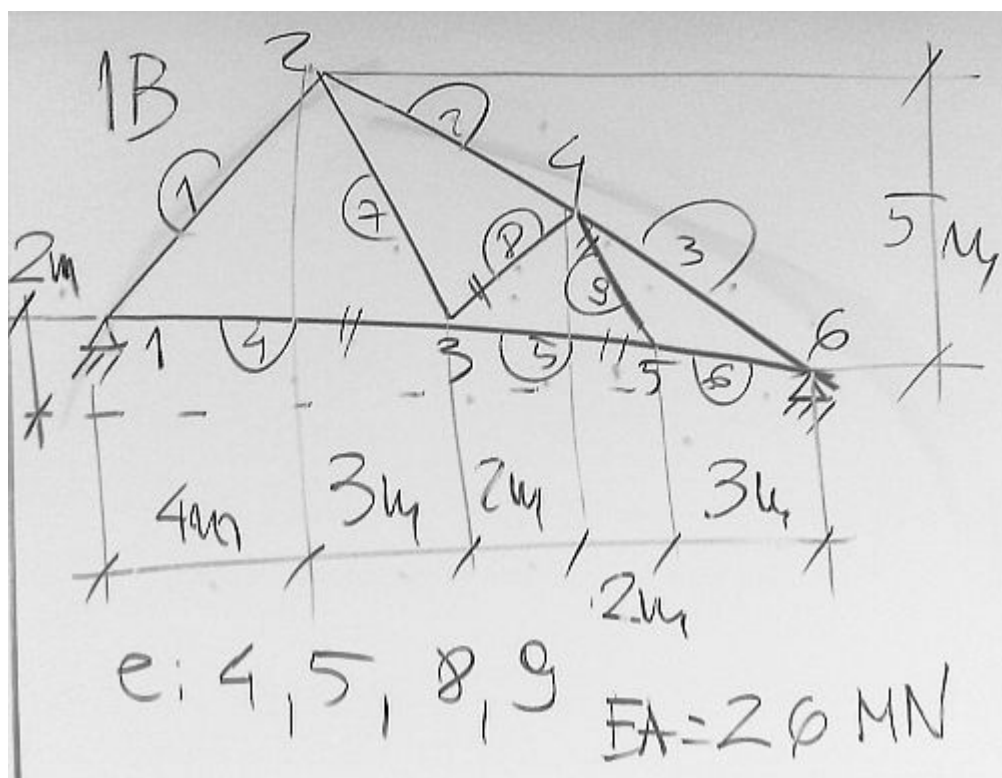


Macierze sztywności elementów kratownicy



elementy := (4, 5, 8, 9)

$EA := 26 \text{ MN}$

$$K = \begin{bmatrix} \text{1} & \text{2} & \text{3} & \text{4} & \text{5} & \text{6} \\ \text{J}^1 + \text{J}^4 & -\text{J}^1 & -\text{J}^4 & & & \\ & \text{J}^1 + \text{J}^2 + \text{J}^7 & -\text{J}^7 & -\text{J}^2 & & \\ & & \text{J}^4 + \text{J}^5 + \text{J}^7 + \text{J}^8 & -\text{J}^8 & -\text{J}^5 & \\ & & & \text{J}^2 + \text{J}^3 + \text{J}^8 + \text{J}^9 & -\text{J}^9 & -\text{J}^3 \\ \text{Symetria} & \text{Symetria} & \text{Symetria} & \text{Symetria} & \text{J}^5 + \text{J}^6 + \text{J}^9 & -\text{J}^6 \\ & & & & & \text{J}^3 + \text{J}^6 \end{bmatrix} \begin{matrix} \text{1} \\ \text{2} \\ \text{3} \\ \text{4} \\ \text{5} \\ \text{6} \end{matrix}$$

Element "4" - blok macierzy sztywności

$$L_x := 7\text{m} \quad L_y := -2\text{m} \cdot \frac{7}{14} = -1.000000\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 7.071068\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix} \quad J = \begin{pmatrix} 3603 & -515 \\ -515 & 74 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "5" - blok macierzy sztywności

$$L_x := 4\text{m} \quad L_y := -2\text{m} \cdot \frac{4}{14} = -0.571429\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 4.04061\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix} \quad J = \begin{pmatrix} 6306 & -901 \\ -901 & 129 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "8" - blok macierzy sztywności

$$L_x := 2\text{m} \quad L_y := 5\text{m} \cdot \frac{5}{10} - 2\text{m} \cdot \frac{7}{14} = 1.500000\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 2.5\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix} \quad J = \begin{pmatrix} 6656 & 4992 \\ 4992 & 3744 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "9" - blok macierzy sztywności

$$L_x := 2\text{m} \quad L_y := 2\text{m} \cdot \frac{3}{14} - 5\text{m} \cdot \frac{5}{10} = -2.071429\text{m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 2.879378\text{m}$$

$$J := \frac{EA}{(L)^3} \cdot \begin{bmatrix} (L_x)^2 & L_x \cdot L_y \\ L_x \cdot L_y & (L_y)^2 \end{bmatrix} \quad J = \begin{pmatrix} 4356 & -4512 \\ -4512 & 4673 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$