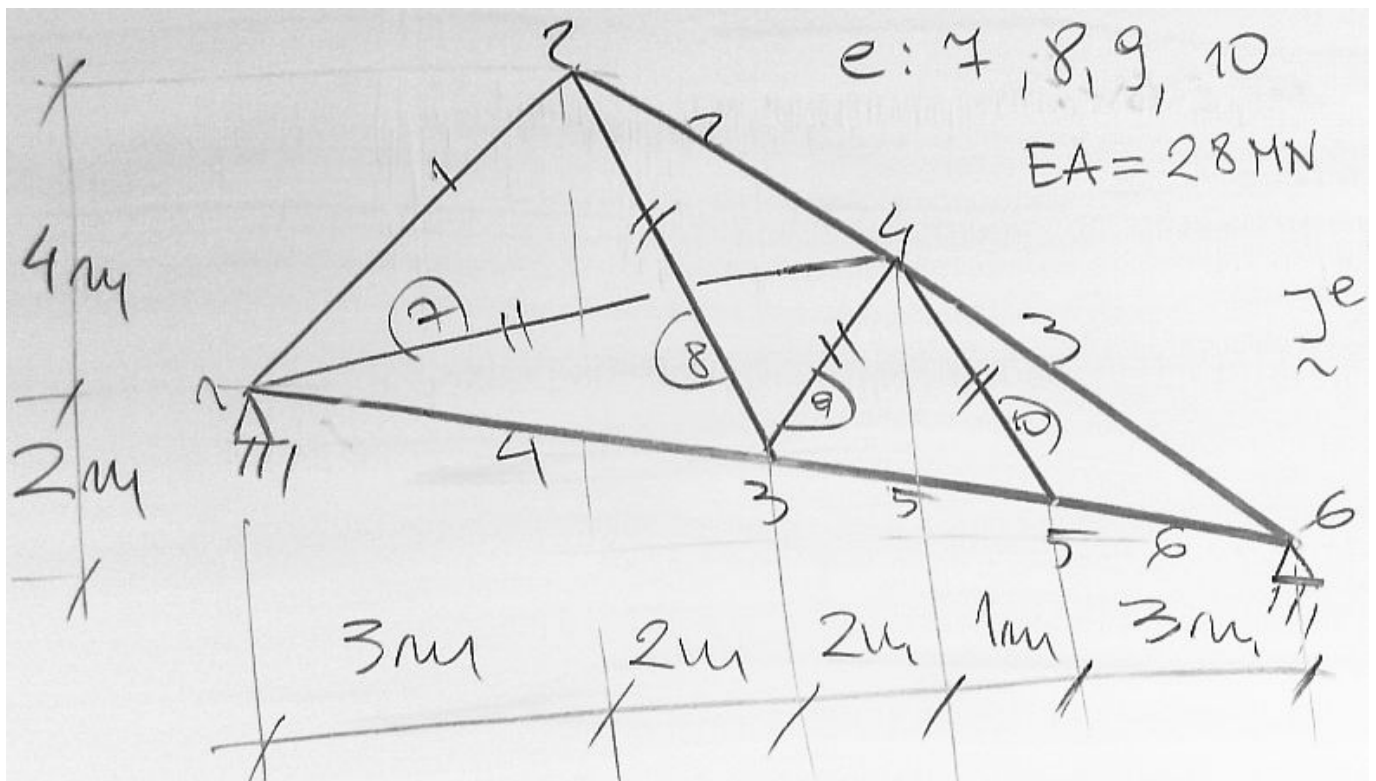


Macierze sztywności elementów kratownicy



elementy := (7, 8, 9, 10) $EA := 28 \text{ MN}$

Element "7" - blok macierzy sztywności

$$L_x := 7 \text{ m} \quad L_y := 1 \text{ m} = 1 \text{ m}$$

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

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

$$J = \begin{pmatrix} 3881 & 554 \\ 554 & 79 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "8" - blok macierzy sztywności

$$L_x := 2 \text{ m} \quad L_y := -\left(4 \text{ m} + \frac{5}{11} \cdot 2 \text{ m}\right) = -4.909091 \text{ m}$$

$$L := \sqrt{(L_x)^2 + (L_y)^2} = 5.300865 \text{ m}$$

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

$$J = \begin{pmatrix} 751.9 & -1845.6 \\ -1845.6 & 4530.2 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "9" - blok macierzy sztywności

$$\underline{L_x} := 2\text{m} \quad \underline{L_y} := 3\text{m} - \frac{6}{11} \cdot 2\text{m} = 1.909091\text{m}$$

$$\underline{L} := \sqrt{(\underline{L_x})^2 + (\underline{L_y})^2} = 2.764892\text{m}$$

$$\underline{J} := \frac{EA}{L^3} \cdot \begin{bmatrix} (\underline{L_x})^2 & \underline{L_x} \cdot \underline{L_y} \\ \underline{L_x} \cdot \underline{L_y} & (\underline{L_y})^2 \end{bmatrix} \quad J = \begin{pmatrix} 5298.9 & 5058.0 \\ 5058.0 & 4828.1 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$

Element "10" - blok macierzy sztywności

$$\underline{L_x} := 1\text{m} \quad \underline{L_y} := -\left(3\text{m} - \frac{3}{11} \cdot 2\text{m}\right) = -2.454545\text{m}$$

$$\underline{L} := \sqrt{(\underline{L_x})^2 + (\underline{L_y})^2} = 2.650433\text{m}$$

$$\underline{J} := \frac{EA}{L^3} \cdot \begin{bmatrix} (\underline{L_x})^2 & \underline{L_x} \cdot \underline{L_y} \\ \underline{L_x} \cdot \underline{L_y} & (\underline{L_y})^2 \end{bmatrix} \quad J = \begin{pmatrix} 1503.9 & -3691.3 \\ -3691.3 & 9060.5 \end{pmatrix} \cdot \frac{\text{kN}}{\text{m}}$$