

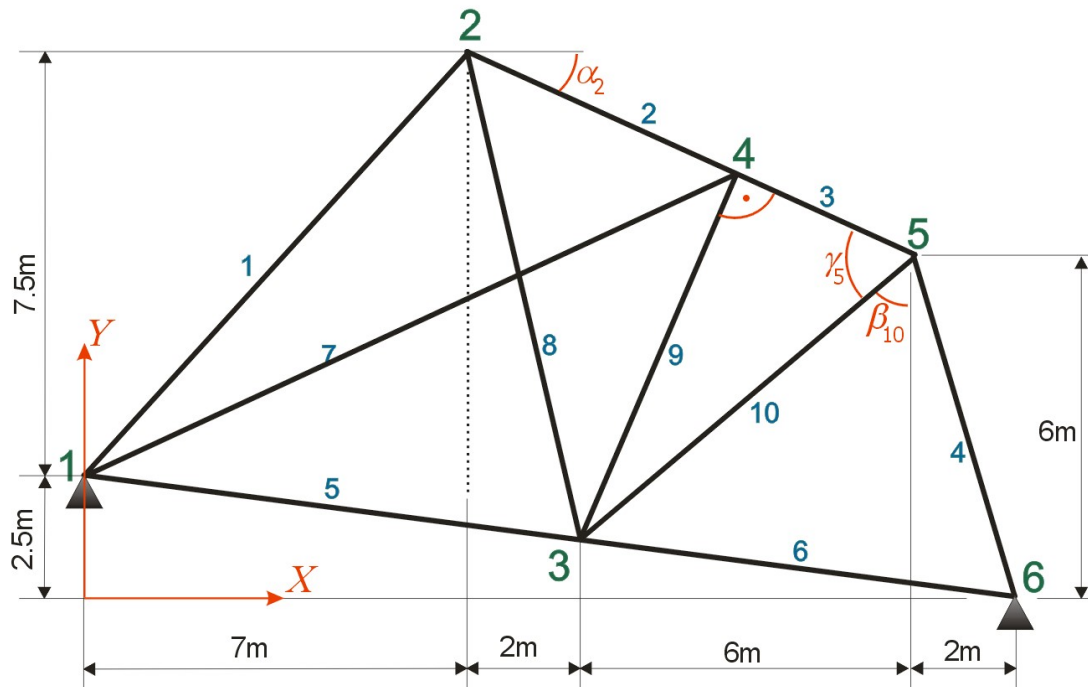
$$EA := 26 \text{ MN}$$

Elementy: 1, 6, 8, 9

$$L(Lx, Ly) := \sqrt{(Lx)^2 + (Ly)^2}$$

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

Wyznaczyć bloki **J** macierzy sztywności elementów kratownicy płaskiej.
Sładowe macierze podać z dokładnością do +/- 0.05 kN/m



$$\alpha_2 := \text{atan}\left(\frac{4}{8}\right) = 26.5650512 \text{ deg}$$

$$Y3 := 2.5 \cdot \frac{8}{17} = 1.1764706$$

$$\beta_{10} := \text{atan}\left(\frac{6}{6 - Y3}\right) = 51.2034479 \text{ deg}$$

$$\gamma_5 := \frac{\pi}{2} + \alpha_2 - \beta_{10} = 65.3616033 \text{ deg}$$

$$l_{10} := L(6, 6 - Y3) \text{ m} = 7.6984697 \text{ m}$$

$$l_3 := l_{10} \cdot \cos(\gamma_5) = 3.2094152 \text{ m}$$

$$l_9 := l_{10} \cdot \sin(\gamma_5) = 6.9975774 \text{ m}$$

$$Y3 := Y3 \text{ m}$$

$$Y4 := 6 \text{ m} + l_3 \cdot \sin(\alpha_2) = 7.44 \text{ m}$$

$$X4 := 15 \text{ m} - l_3 \cdot \cos(\alpha_2) = 12.1294118 \text{ m}$$

Element "1"

$$Lx := 7 \text{ m} = 7 \text{ m}$$

$$Ly := 7.5 \text{ m} = 7.50000 \text{ m}$$

$$L := \sqrt{(Lx)^2 + (Ly)^2} = 10.2591423 \text{ m}$$

$$J^1 = \begin{bmatrix} 1179.9 & 1264.2 \\ 1264.2 & 1354.4 \end{bmatrix} \frac{\text{kN}}{\text{m}}$$

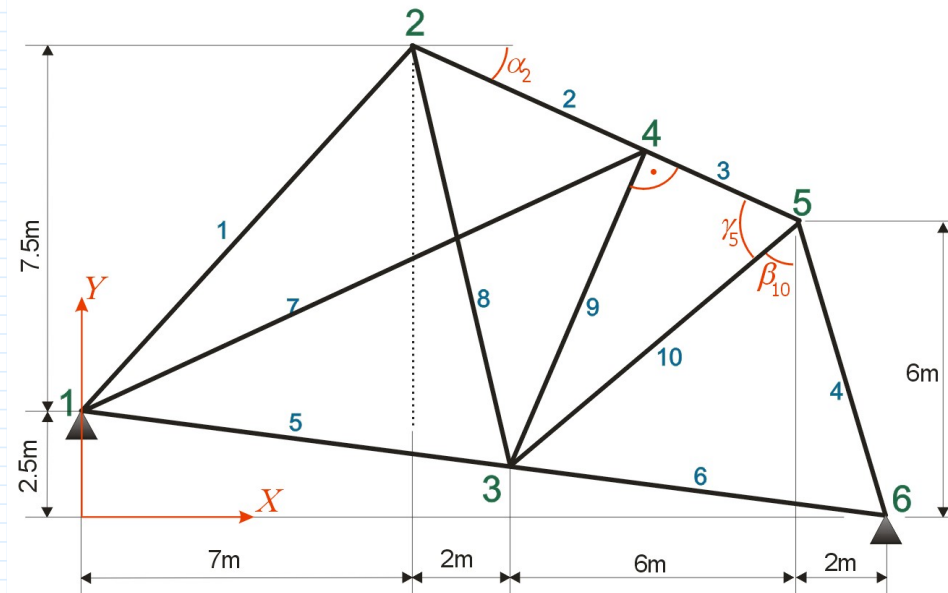
Element "6"

$$Lx := 8 \text{ m} = 8 \text{ m}$$

$$Ly := -Y3 = -1.176471 \text{ m}$$

$$L := \sqrt{(Lx)^2 + (Ly)^2} = 8.086042 \text{ m}$$

$$J^6 = \begin{bmatrix} 3147.4 & -462.8 \\ -462.8 & 68.1 \end{bmatrix} \frac{\text{kN}}{\text{m}}$$



Element "8"

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

$$Ly := -(10 \text{ m} - Y3) = -8.823529 \text{ m}$$

$$L := \sqrt{(Lx)^2 + (Ly)^2} = 9.0473571 \text{ m}$$

$$J^8 = \begin{bmatrix} 140.4 & -619.6 \\ -619.6 & 2733.3 \end{bmatrix} \frac{\text{kN}}{\text{m}}$$

Element "9"

$$Lx := X4 - 9 \text{ m} = 3.129412 \text{ m}$$

$$Ly := Y4 - Y3 = 6.258824 \text{ m}$$

$$L := \sqrt{(Lx)^2 + (Ly)^2} = 6.997577 \text{ m}$$

$$J^9 = \begin{bmatrix} 743.1 & 1486.2 \\ 1486.2 & 2972.5 \end{bmatrix} \frac{\text{kN}}{\text{m}}$$

