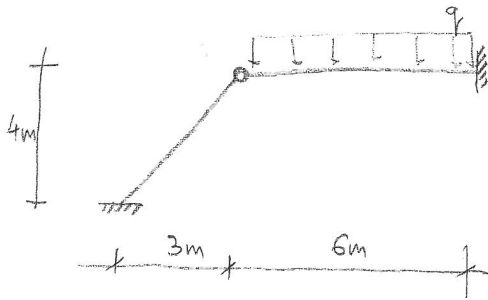


# Tartók statikája

## Síkbeli keretek



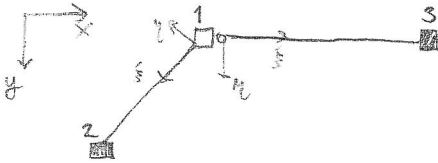
$$EA = 10000 \text{ kN}$$

$$EI = 2000 \text{ kNm}^2$$

$$q = 4 \text{ kN/m}$$

elmozdulások?

### 1. modell



$$1,2: \underline{T}_1 = \begin{bmatrix} -0,6 & -0,8 & 0 \\ 0,8 & -0,6 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad 4,3: \underline{T}_2 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$\underline{v} = \underline{v}_1 = \begin{bmatrix} v_{1x} \\ v_{1y} \\ \varphi_{12} \end{bmatrix} \quad \underline{q} = \underline{q}_1 = \begin{bmatrix} F_{1x} \\ F_{1y} \\ W_{12} \end{bmatrix}$$

$$\underline{k}_{12}^{11,22} = \begin{bmatrix} EA/l & 0 & 0 \\ 0 & \frac{12EI}{l^3} & \frac{6EI}{l^2} \\ 0 & \frac{6EI}{l^2} & \frac{4EI}{l} \end{bmatrix} = \begin{bmatrix} 2000 & 0 & 0 \\ 0 & 192 & 480 \\ 0 & 480 & 1600 \end{bmatrix}$$

$$\underline{k}_{12}^{11} = \underline{T}_1 \underline{k}_{12}^{11,22} \underline{T}_1^T = \begin{bmatrix} 842,88 & -867,84 & -384 \\ -867,84 & 1343,12 & -288 \\ -384 & -288 & 1600 \end{bmatrix}$$

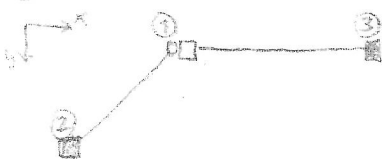
$$\underline{k}_{13}^{11,22} = \underline{k}_{13}^{11} = \begin{bmatrix} \frac{EA}{l} & 0 & 0 \\ 0 & \frac{3EI}{l^3} & 0 \\ 0 & 0 & 0 \end{bmatrix} = \begin{bmatrix} 1666,67 & 0 & 0 \\ 0 & 27,78 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\underline{K} = \underline{k}_{12}^{11} + \underline{k}_{13}^{11} = \begin{bmatrix} 2509,55 & -867,84 & -384 \\ -867,84 & 1376,90 & -288 \\ -384 & -288 & 1600 \end{bmatrix}$$

$$\underline{q} = \underline{q}_1 = \begin{bmatrix} 0 \\ \frac{2}{80}ql \\ 0 \end{bmatrix} = \begin{bmatrix} 0 \\ 9 \\ 0 \end{bmatrix}$$

$$\underline{v} = \underline{K}^{-1} \underline{q} = \begin{bmatrix} 0,003626 \\ 0,003356 \\ 0,002554 \end{bmatrix}$$

### 2. modell



$$\underline{q} = \begin{bmatrix} 0 \\ \frac{1}{2}ql \\ \frac{1}{12}ql^2 \end{bmatrix} = \begin{bmatrix} 0 \\ 12 \\ 12 \end{bmatrix}$$

$$\underline{k}_{12}^{11,22} = \begin{bmatrix} EA/l & 0 & 0 \\ 0 & \frac{12EI}{l^3} & \frac{6EI}{l^2} \\ 0 & \frac{6EI}{l^2} & \frac{4EI}{l} \end{bmatrix} = \begin{bmatrix} 2000 & 0 & 0 \\ 0 & 48 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\underline{k}_{12}^{11} = \begin{bmatrix} 750,72 & -936,96 & 0 \\ -936,96 & 1237,28 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\underline{k}_{13}^{11,22} = \underline{k}_{13}^{11} = \begin{bmatrix} \frac{EA}{l} & 0 & 0 \\ 0 & \frac{12EI}{l^3} & \frac{6EI}{l^2} \\ 0 & \frac{6EI}{l^2} & \frac{4EI}{l} \end{bmatrix} = \begin{bmatrix} 1666,67 & 0 & 0 \\ 0 & 111,11 & 333,33 \\ 0 & 333,33 & 1333,33 \end{bmatrix}$$

$$\underline{K} = \begin{bmatrix} 2417,39 & -936,96 & 0 \\ -936,96 & 1408,39 & 333,33 \\ 0 & 333,33 & 1333,33 \end{bmatrix}$$

$$\underline{v} = \underline{K}^{-1} \underline{q} = \begin{bmatrix} 0,003626 \\ 0,003356 \\ 0,006661 \end{bmatrix}$$