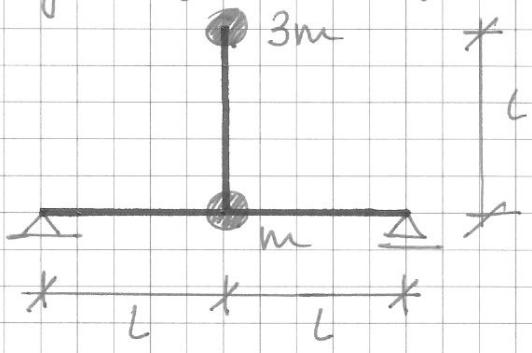
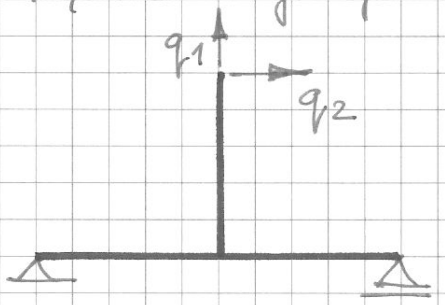
Kolokwium z MK2, 2.3a, r.ak. 2013/2014

Obliczyć ω_i. $EJ = const.$

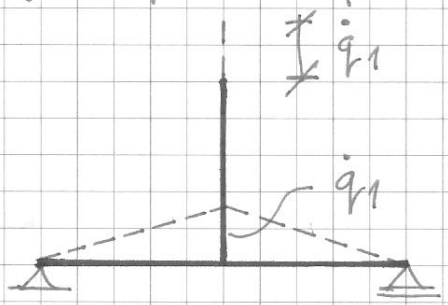


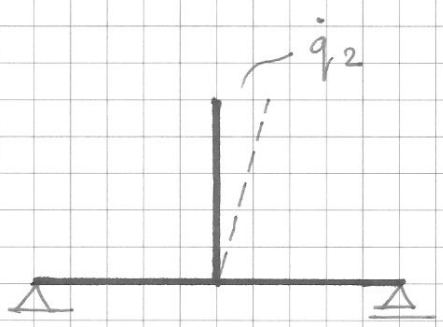
Współrzędne Lagrange'a



$$\mathbb{q} = \begin{bmatrix} q_1 \\ q_2 \end{bmatrix}$$

Plany amplitud prędkości

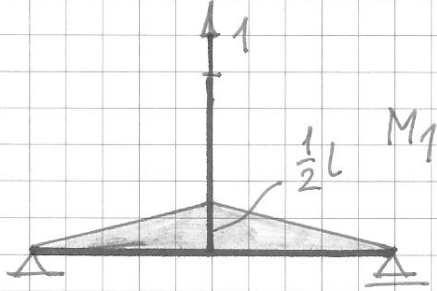


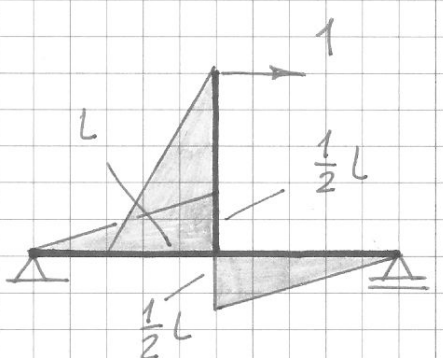


Energia kinetyczna

$$2E_k = m\cdot\dot{q}_1^2 + 3m\left[\dot{q}_1^2 + \dot{q}_2^2\right] = \dot{\mathbb{q}}^T\,\mathbb{M}\,\dot{\mathbb{q}}$$

$$\mathbb{M} = \begin{bmatrix} 4 & 0 \\ 0 & 3 \end{bmatrix} m$$



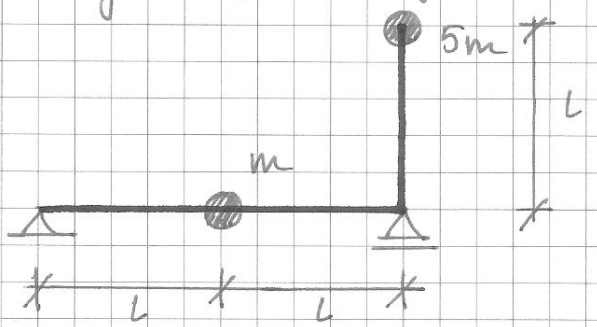


$$\mathbb{D} = \begin{bmatrix} \frac{1}{6} & 0 \\ 0 & \frac{1}{2} \end{bmatrix} \frac{L^3}{EJ}, \quad \mathbb{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}, \quad \det\left(\mathbb{I} - \omega^2 \mathbb{D}\mathbb{M}\right) = 0 \rightarrow \omega_1 = 1{,}22\sqrt{\frac{EJ}{mL^3}}$$

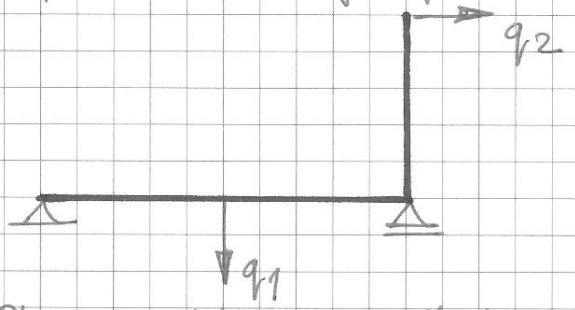
$$\omega_2 = 0{,}82 \text{ —"—}$$

Kolokwium z MK2, 2.3b, r.ak. 2013/2014

Obliczyć ω_i. $EJ = const.$

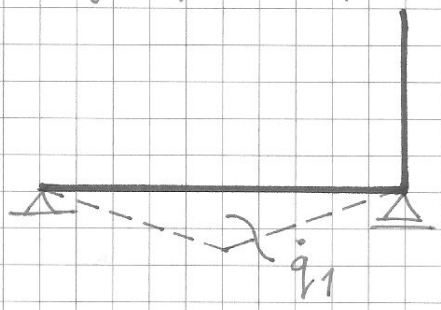


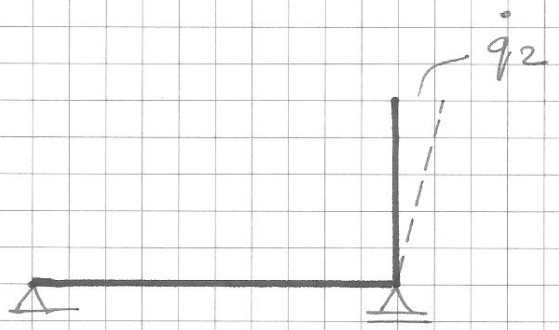
Współrzędne Lagrange'a



$$q = \begin{bmatrix} q_1 \\ q_2 \end{bmatrix}$$

Plany amplitud prędkości

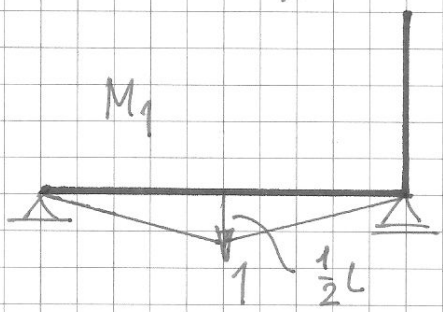


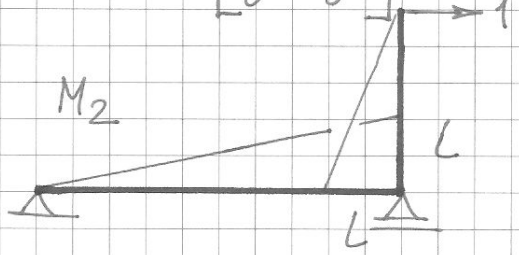


Energia kinetyczna

$$2E_k = m\dot{q}_1^2 + 5m\dot{q}_2^2$$

$$\mathbb{M} = \begin{bmatrix} 1 & 0 \\ 0 & 5 \end{bmatrix} m$$





$$\mathbb{D} = \begin{bmatrix} 0{,}167 & -0{,}250 \\ -0{,}250 & 1 \end{bmatrix} \frac{L^3}{EJ}$$

$$\mathbb{I} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\det(\mathbb{I} - \omega^2 \mathbb{D}\mathbb{M}) = 0 \longrightarrow$$

$$\omega_1 = 0{,}444 \sqrt{\frac{EJ}{mL^3}}$$

$$\omega_2 = 3{,}118 \sqrt{\frac{EJ}{mL^3}}$$