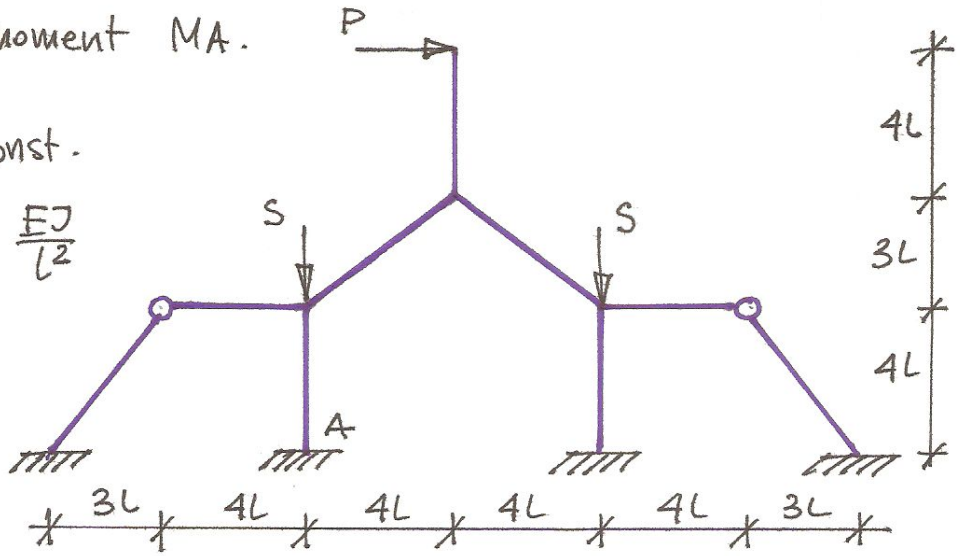
Kolokwium 26.04.2016 , 1.2a , 2015/2016

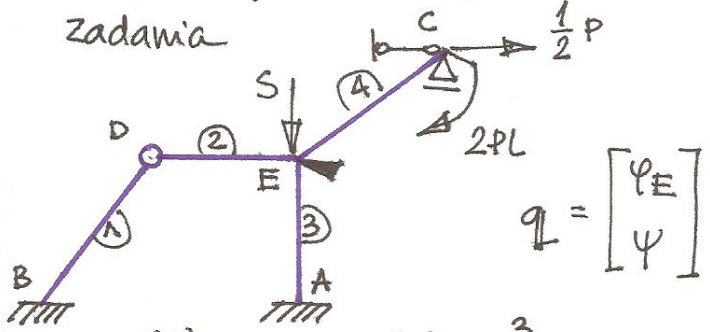
Oblicz moment MA.



$EJ = const.$

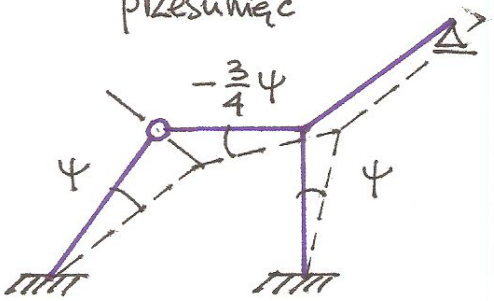
$S = \frac{9}{64}\frac{EJ}{l^2}$

Korzystamy z antysymetrii zadania



$q = \begin{bmatrix} \varphi_E \\ \psi \end{bmatrix}$

Plan przesunięć



$S^{(3)} = S \qquad \sigma^{(3)} = \frac{3}{2}$

Równania równowagi

$$\Phi_E^{(2)} + \Phi_E^{(3)} + \Phi_E^{(4)} = 0$$

$$\Phi_B^{(1)} \cdot \bar{\psi} + \Phi_E^{(2)} \cdot \left(-\tfrac{3}{4}\bar{\psi}\right) + \left[\Phi_A^{(3)} + \Phi_E^{(3)}\right] \cdot \bar{\psi} + S\psi \cdot 4L \cdot \bar{\psi} + \tfrac{1}{2}P \cdot 4L \cdot \bar{\psi} = 0$$

Wzory transformacyjne

$$\Phi_B^{(1)} = \frac{EJ}{5L}\left[-3\psi\right]$$

$$\Phi_E^{(2)} = \frac{EJ}{4L}\left[3\varphi_E + \frac{9}{4}\psi\right]$$

$$\Phi_A^{(3)} = \frac{EJ}{4L}\left[\beta\left(\tfrac{3}{2}\right)\varphi_E - \nu\left(\tfrac{3}{2}\right)\psi\right]$$

$$\Phi_E^{(3)} = \frac{EJ}{4L}\left[\alpha\left(\tfrac{3}{2}\right)\varphi_E - \nu\left(\tfrac{3}{2}\right)\psi\right]$$

$$\Phi_E^{(4)} = \frac{EJ}{5L}\left[3\varphi_E\right] + PL$$

Rozwiązanie

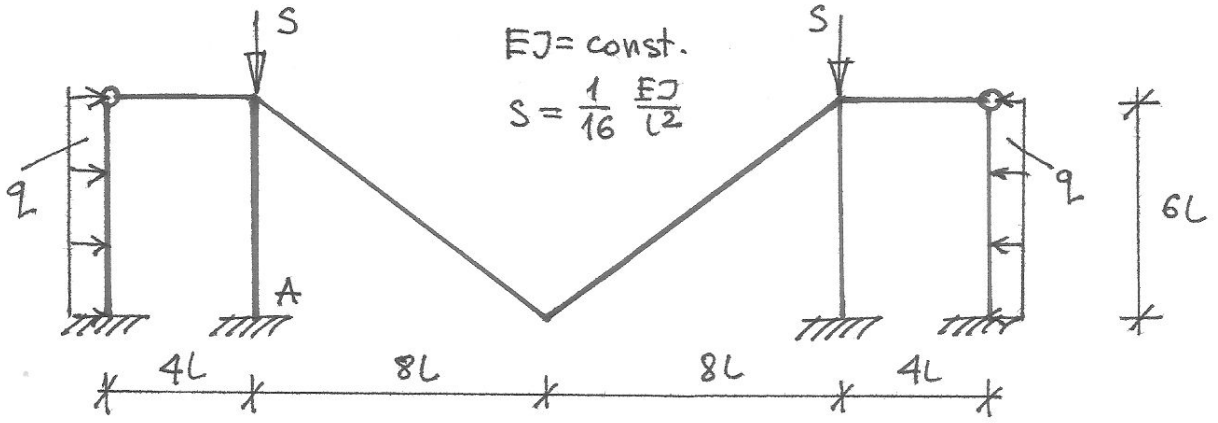
$$\varphi_E = -0{,}232\,\frac{PL^2}{EJ}$$

$$\psi = 0{,}537\,\frac{PL^2}{EJ}$$

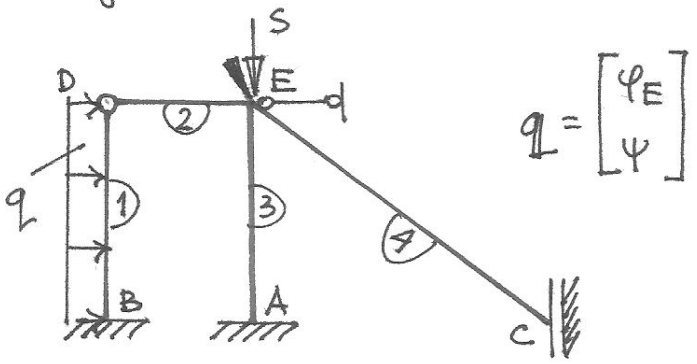
$$\Phi_A^{(3)} = -0{,}895\,PL$$

Kolokwium 28.04.2016, 1.25, 2015/2016

Oblicz moment M_A.

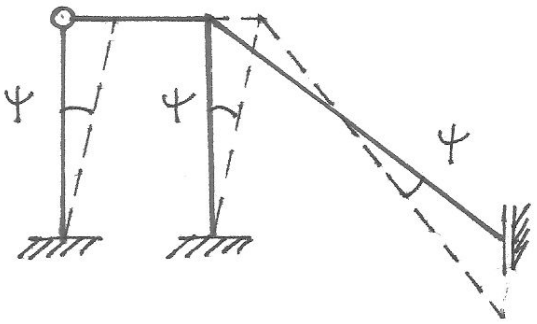


Korzystamy z symetrii zadania



$$q = \begin{bmatrix} \varphi_E \\ \psi \end{bmatrix}$$

Plan przesunięć



$S^{(3)} = S \qquad \sigma^{(3)} = \frac{3}{2}$

Równania równowagi

$$\Phi_E^{(2)} + \Phi_E^{(3)} + \Phi_E^{(4)} = 0$$

$$\Phi_B^{(1)} \cdot \bar{\psi} + \left[\Phi_A^{(3)} + \Phi_E^{(3)}\right] \cdot \bar{\psi} + \left[\Phi_C^{(4)} + \Phi_E^{(4)}\right] \cdot \bar{\psi} + S \cdot 6L \cdot \psi \cdot \bar{\psi} + q \cdot 6L \cdot \frac{1}{2} \bar{\psi}\, 6l = 0$$

Wzory transformacyjne

$$\Phi_B^{(1)} = \frac{EJ}{6L}\left[-3\psi\right] - \frac{1}{8} q (6L)^2$$

$$\Phi_E^{(2)} = \frac{EJ}{4L}\left[3\varphi_E\right]$$

$$\Phi_A^{(3)} = \frac{EJ}{6L}\left[\beta\left(\tfrac{3}{2}\right)\varphi_E - \nu\left(\tfrac{3}{2}\right)\psi\right]$$

$$\Phi_E^{(3)} = \frac{EJ}{6L}\left[\alpha\left(\tfrac{3}{2}\right)\varphi_E - \nu\left(\tfrac{3}{2}\right)\psi\right]$$

$$\Phi_C^{(4)} = \frac{EJ}{10L}\left[2\varphi_E - 6\psi\right]$$

$$\Phi_E^{(4)} = \frac{EJ}{10L}\left[4\varphi_E - 6\psi\right]$$

Rozwiązanie

$$\varphi_E = 6{,}399 \frac{qL^3}{EJ}$$

$$\psi = 7{,}232 \frac{qL^3}{EJ}$$

$$\Phi_A^{(3)} = -4{,}737\, qL^2$$