

ZAD 3 Odredite ramstožni položaj štapa na troji djeluje sila $h(x) = Ae^{2x}$ ako su lijevi i desni kraj fiksni.

Rj:

$$\rightarrow u^{(4)}(x) = Ae^{2x} \quad \text{uz} \quad u(0) = u''(0) = 0 \quad \text{i} \quad u(l) = u''(l) = 0.$$

$$\Rightarrow u(x) = \frac{A}{2^4} e^{2x} + \frac{C_1}{6} x^3 + \frac{C_2}{2} x^2 + C_3 x + C_4.$$

Iz rubnih uvjeta:

$$u(0) = 0 \Rightarrow \frac{A}{2^4} + C_4 = 0 \Rightarrow C_4 = -\frac{A}{2^4}$$

$$u''(0) = 0 \Rightarrow \frac{A}{2^2} + C_2 = 0 \Rightarrow C_2 = -\frac{A}{2^2}$$

$$\left. \begin{aligned} u(l) = 0 &\Rightarrow \frac{A}{2^4} e^{2l} + \frac{C_1}{6} l^3 - \frac{A}{2^2} l^2 + C_3 l - \frac{A}{2^4} = 0 \\ u''(l) = 0 &\Rightarrow \frac{A}{2^2} e^{2l} + C_1 l - \frac{A}{2^2} = 0 \end{aligned} \right\} \begin{aligned} C_1 &= \frac{A}{2^2 l} (1 - e^{2l}) \\ C_3 &= \frac{A}{2^4 l} (1 - e^{2l}) + \frac{A l}{6 l^2} (2 + e^{2l}) \end{aligned}$$

$$\Rightarrow u(x) = \frac{A}{6 l^4} \left(6 l \cdot e^{2x} + l^2 (1 - e^{2l}) x^3 - 3 l^2 x^2 + 6 (1 - e^{2l}) x + l^2 (2 + e^{2l}) x - 6 l \right)$$

Zad 4 Odredite romoležni plošaj štapa na logi dječije sja
 $u(x) = A \sin dx$ ako su dva kraja uvršćena.

Rj.

$$\rightarrow u^{(4)}(x) = A \sin dx \quad \text{uz} \quad u(0) = u'(0) = 0 \quad \text{i} \quad u(l) = u'(l) = 0.$$

$$\Rightarrow u(x) = \frac{A}{d^4} \sin dx + \frac{C_1}{6} x^3 + \frac{C_2}{2} x^2 + C_3 x + C_4.$$

iz rubnih uvjeta:

$$u(0) = 0 \Rightarrow C_4 = 0$$

$$u'(0) = 0 \Rightarrow \frac{A}{d^3} + C_3 = 0 \Rightarrow C_3 = -\frac{A}{d^3}$$

$$u(l) = 0 \Rightarrow \frac{A}{d^4} \sin dl + \frac{C_1}{6} l^3 + \frac{C_2}{2} l^2 - \frac{A}{d^3} l = 0$$

$$u'(l) = 0 \Rightarrow \frac{A}{d^3} \cos dl + \frac{C_1}{2} l + C_2 - \frac{A}{d^3} = 0$$

$$C_1 = \frac{6A}{l^2 d^3} - \frac{6A}{l^2 d^3} \cos dl - \frac{12A}{l^2 d^3} + \frac{12A}{l^3 d^4} \sin dl$$

$$C_2 = \frac{4A}{l^3} + \frac{2A}{l^2 d^3} \cos dl - \frac{6A}{l^2 d^4} \sin dl$$