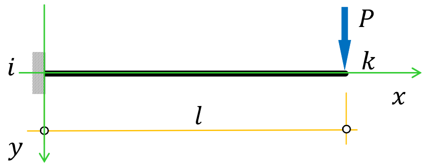
Примери

За све носаче са датим оптерећењима приказани на скицама потребно је извести функције: еластичне линије обртања момената савијања вертикалних сила попречних пресека дуж носача по теорији првог реда.

Štap tipa - S - KONZOLA



$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$\frac{d}{dx} v(x) \rightarrow \alpha 2 + 3 \cdot \alpha 4 \cdot x^2 + 2 \cdot \alpha 3 \cdot x + \frac{p \cdot x^3}{6 \cdot EI}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x) \rightarrow 2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot x + \frac{p \cdot x^2}{2 \cdot EI}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \rightarrow 6 \cdot \alpha 4 + \frac{p \cdot x}{EI}$$ .... V(x) (kN)

Konturni uslovi:

$v(0) = 0$ $\qquad \phi(0) = 0$ $\qquad M(L) = 0$ $\qquad V(L) = -P$

Given $\qquad p := 0$

$$\alpha 1 + \alpha 2 \cdot 0 + \alpha 3 \cdot 0^2 + \alpha 4 \cdot (0)^3 + \frac{p \cdot 0^4}{24 \cdot EI} = 0$$

$$\alpha 2 + 3 \cdot \alpha 4 \cdot (0)^2 + 2 \cdot \alpha 3 \cdot 0 + \frac{p \cdot (0)^3}{6 \cdot EI} = 0$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot L + \frac{p \cdot L^2}{2 \cdot EI} = 0$$

$$6 \cdot \alpha 4 + \frac{p \cdot L}{EI} = -P$$

$$\text{Find}(\alpha 1, \alpha 2, \alpha 3, \alpha 4) \rightarrow \begin{pmatrix} 0 \\ 0 \\ \frac{L \cdot P}{2} \\ -\frac{P}{6} \end{pmatrix}$$

Konstante su:

$\alpha 1 := 0$ $\qquad \alpha 2 := 0$

$\alpha 3 := \frac{L \cdot P}{2}$ $\qquad \alpha 4 := -\frac{P}{6}$

Elastična linija savijanja nosača:

$$v(x) := \alpha 1 + \alpha 2\cdot x + \alpha 3\cdot x^2 + \alpha 4\cdot x^3 + \frac{p\cdot x^4}{24\cdot EI}$$

$$v(x) \text{ simplify } \rightarrow -\frac{P\cdot x^2\cdot(x-3\cdot L)}{6}$$ .... v(x) (m)

$$\frac{d}{dx}v(x) \text{ simplify } \rightarrow -\frac{P\cdot x\cdot(x-2\cdot L)}{2}$$ .... ϕ(x) (rad)

$$\frac{d^2}{dx^2}v(x) \text{ simplify } \rightarrow P\cdot(L-x)$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3}v(x) \text{ simplify } \rightarrow -P$$ .... V(x) (kN)

Podaci :

$x := 0, 0.1 .. 8$ $\quad L := 8$ m $\quad P := 10$ kN $\quad EI := 5.46\cdot 10^4$ kNm^2

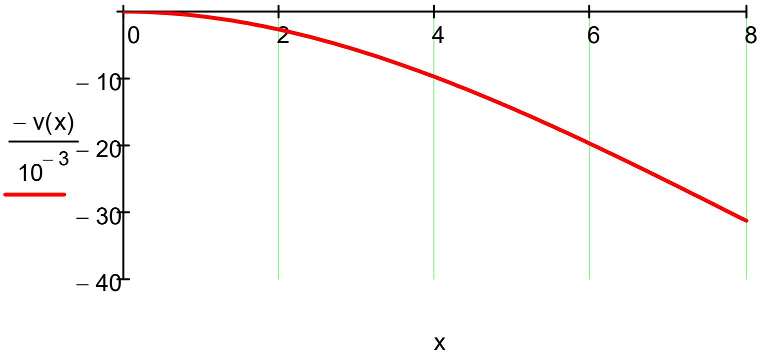
Konačne funkcije uticaja u nosaču:

$$v(x) := -\frac{P\cdot x^2\cdot(x-3\cdot L)}{6}\cdot\frac{1}{EI}$$

$$\phi(x) := -\frac{P\cdot x\cdot(x-2\cdot L)}{2}\cdot\frac{1}{EI}$$

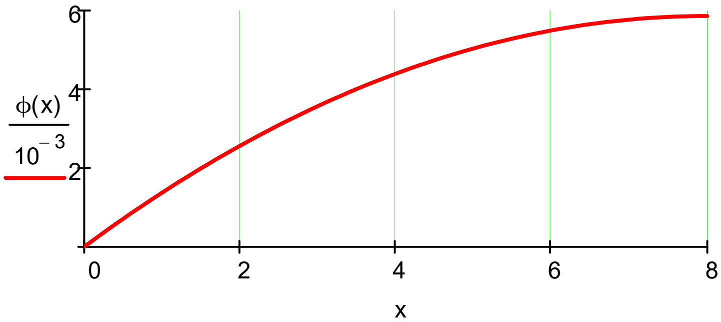
$$M(x) := P\cdot(L-x)$$

$$V(x) := -P$$



(mm)

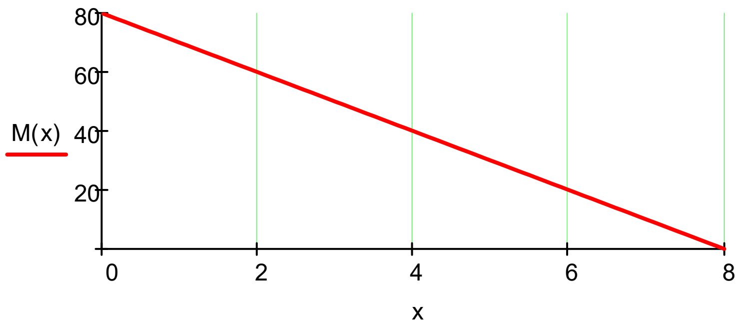
$$\frac{v(L)}{10^{-3}} = 31.26$$



(rad)

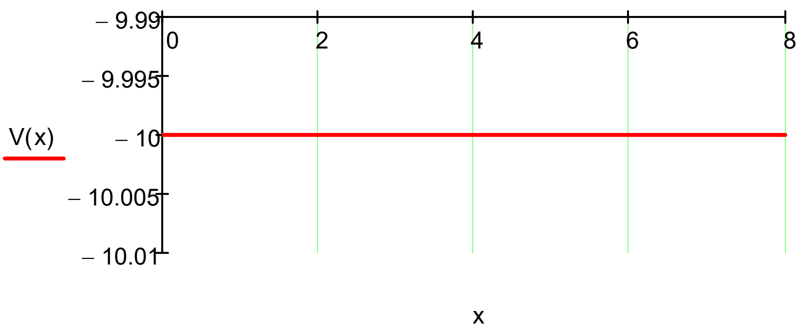
$\phi(0) = 0$

$\phi(L) = 0.00586$



(kNm)

$M(0) = 80$

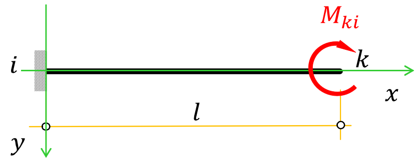


(kN)

$-V(0) = 10$

$V(L) = -10$

Štap tipa - S - KONZOLA



$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$\frac{d}{dx} v(x) \rightarrow \alpha 2 + 3 \cdot \alpha 4 \cdot x^2 + 2 \cdot \alpha 3 \cdot x + \frac{p \cdot x^3}{6 \cdot EI}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x) \rightarrow 2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot x + \frac{p \cdot x^2}{2 \cdot EI}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \rightarrow 6 \cdot \alpha 4 + \frac{p \cdot x}{EI}$$ .... V(x) (kN)

Konturni uslovi:

$v(0) = 0$ $\quad$ $\phi(0) = 0$ $\quad$ $M(L) = M_{ki}$ $\quad$ $V(L) = 0$

Given $\quad$ $p := 0$

$$\alpha 1 + \alpha 2 \cdot 0 + \alpha 3 \cdot 0^2 + \alpha 4 \cdot (0)^3 + \frac{p \cdot 0^4}{24 \cdot EI} = 0$$

$$\alpha 2 + 3 \cdot \alpha 4 \cdot (0)^2 + 2 \cdot \alpha 3 \cdot 0 + \frac{p \cdot (0)^3}{6 \cdot EI} = 0$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot L + \frac{p \cdot L^2}{2 \cdot EI} = M_{ki}$$

$$6 \cdot \alpha 4 + \frac{p \cdot L}{EI} = 0$$

$$\text{Find}(\alpha 1, \alpha 2, \alpha 3, \alpha 4) \rightarrow \begin{pmatrix} 0 \\ 0 \\ \frac{M_{ki}}{2} \\ 0 \end{pmatrix}$$

Konstante su:

$\alpha 1 := 0$ $\quad$ $\alpha 2 := 0$

$\alpha 3 := \frac{M_{ki}}{2}$ $\quad$ $\alpha 4 := 0$

Elastična linija savijanja nosača:

$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$v(x)\ \text{simplify}\ \rightarrow \frac{M_{ki} \cdot x^2}{2}$$ .... v(x) (m)

$$\frac{d}{dx} v(x)\ \text{simplify}\ \rightarrow M_{ki} \cdot x$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x)\ \text{simplify}\ \rightarrow M_{ki}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x)\ \text{simplify}\ \rightarrow 0$$ .... V(x) (kN)

Podaci :

$x := 0, 0.1 .. 8$ $L := 8\ \text{m}$ $M_{ki} := 10\ \text{kNm}$ $EI := 5.46 \cdot 10^4\ \text{kNm}^2$

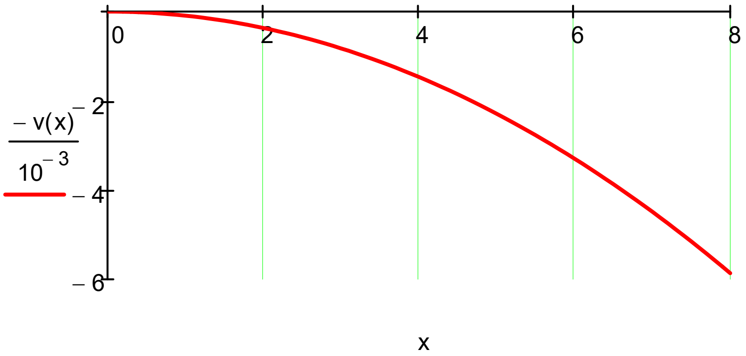
Konačne funkcije uticaja u nosaču:

$$v(x) := \frac{M_{ki} \cdot x^2}{2} \cdot \frac{1}{EI}$$

$$\phi(x) := M_{ki} \cdot x \cdot \frac{1}{EI}$$

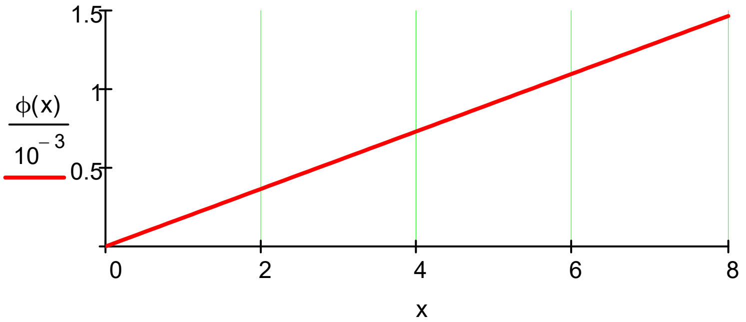
$$M(x) := M_{ki}$$

$$V(x) := 0$$



(mm)

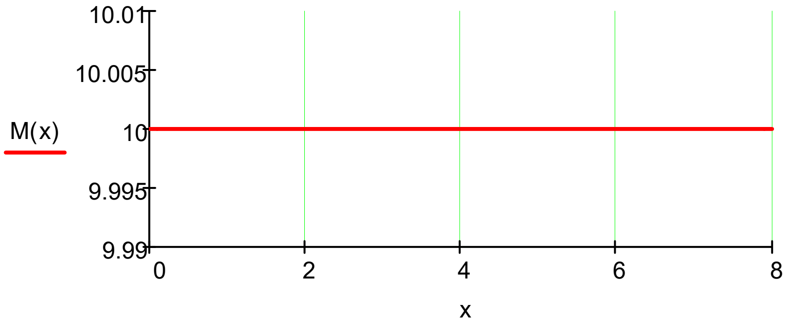
$$\frac{v(L)}{10^{-3}} = 5.86$$



(rad)

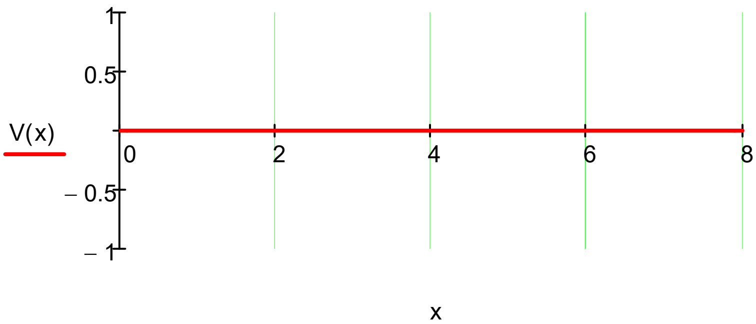
$\phi(0) = 0$

$\phi(L) = 0.00147$



(kNm)

$M(0) = 10$

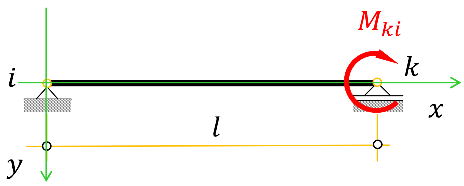


(kN)

$-V(0) = 0$

$V(L) = 0$

Štap tipa - PROSTA GREDA



$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$\frac{d}{dx} v(x) \rightarrow \alpha 2 + 3 \cdot \alpha 4 \cdot x^2 + 2 \cdot \alpha 3 \cdot x + \frac{p \cdot x^3}{6 \cdot EI}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x) \rightarrow 2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot x + \frac{p \cdot x^2}{2 \cdot EI}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \rightarrow 6 \cdot \alpha 4 + \frac{p \cdot x}{EI}$$ .... V(x) (kN)

Konturni uslovi:

$v(0) = 0$ $\quad$ $M(0) = 0$ $\quad$ $M(L) = M$ $\quad$ $v(L) = 0$

Given $\quad p := 0$

$$\alpha 1 + \alpha 2 \cdot 0 + \alpha 3 \cdot 0^2 + \alpha 4 \cdot (0)^3 + \frac{p \cdot 0^4}{24 \cdot EI} = 0$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot 0 + \frac{p \cdot 0^2}{2 \cdot EI} = 0$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot L + \frac{p \cdot L^2}{2 \cdot EI} = M$$

$$\alpha 1 + \alpha 2 \cdot L + \alpha 3 \cdot L^2 + \alpha 4 \cdot L^3 + \frac{p \cdot L^4}{24 \cdot EI} = 0$$

$$\text{Find}(\alpha 1, \alpha 2, \alpha 3, \alpha 4) \rightarrow \begin{pmatrix} 0 \\ -\frac{L \cdot M}{6} \\ 0 \\ \frac{M}{6 \cdot L} \end{pmatrix}$$

Konstante su:

$\alpha 1 := 0$ $\qquad$ $\alpha 2 := -\frac{L \cdot M}{6}$

$\alpha 3 := 0$ $\qquad$ $\alpha 4 := \frac{M}{6 \cdot L}$

Elastična linija savijanja štapa:

$$v(x) := \alpha1 + \alpha2 \cdot x + \alpha3 \cdot x^2 + \alpha4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$v(x) \text{ simplify } \rightarrow -\frac{M \cdot x \cdot (L^2 - x^2)}{6 \cdot L}$$ .... v(x) (m)

$$\frac{d}{dx} v(x) \text{ simplify } \rightarrow -\frac{M \cdot (L^2 - 3 \cdot x^2)}{6 \cdot L}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x) \text{ simplify } \rightarrow \frac{M \cdot x}{L}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \text{ simplify } \rightarrow \frac{M}{L}$$ .... V(x) (kN)

Podaci :

$x := 0, 0.1 .. 8$ $L := 8$ m $M := 10$ kNm $EI := 5.46 \cdot 10^4$ kNm^2

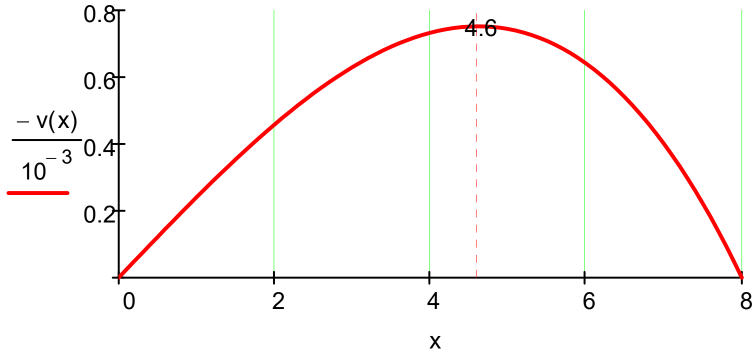
Konačne funkcije uticaja u štapu:

$$v(x) := -\frac{M \cdot x \cdot (L^2 - x^2)}{6 \cdot L} \cdot \frac{1}{EI}$$

$$\phi(x) := -\frac{M \cdot (L^2 - 3 \cdot x^2)}{6 \cdot L} \cdot \frac{1}{EI}$$

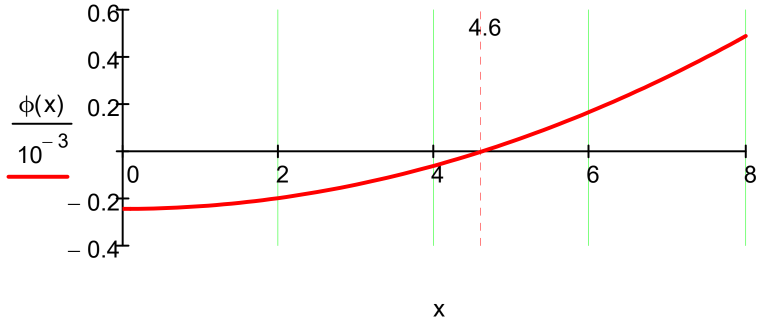
$$M(x) := \frac{M \cdot x}{L}$$

$$V(x) := \frac{M}{L} \qquad V := \frac{10}{8}$$



(mm)

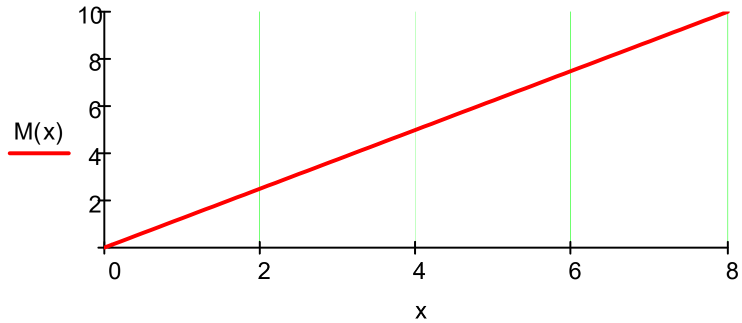
$\frac{v(4.6)}{10^{-3}} = -0.75$



(rad)

$\phi(0) = -0.00024$

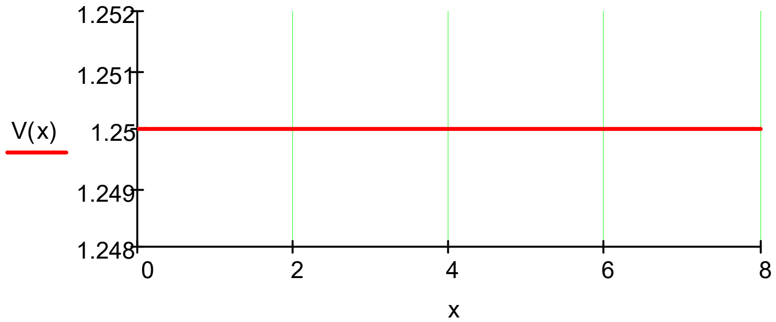
$\phi(L) = 0.00049$



(kNm)

$M(L) = 10$

$V(x) := V$

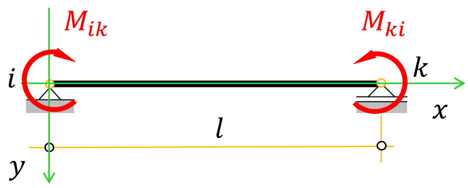


(kN)

$-V(0) = -1.25$

$V(L) = 1.25$

Štap tipa - PROSTA GREDA - čisto savijanje



$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$\frac{d}{dx} v(x) \rightarrow \alpha 2 + 3 \cdot \alpha 4 \cdot x^2 + 2 \cdot \alpha 3 \cdot x + \frac{p \cdot x^3}{6 \cdot EI}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2} v(x) \rightarrow 2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot x + \frac{p \cdot x^2}{2 \cdot EI}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \rightarrow 6 \cdot \alpha 4 + \frac{p \cdot x}{EI}$$ .... V(x) (kN)

Konturni uslovi:

$v(0) = 0$ $\qquad M(0) = M_{ik}$ $\qquad M(L) = -M_{ki}$ $\qquad v(L) = 0$

Given $\qquad p := 0$

$$\alpha 1 + \alpha 2 \cdot 0 + \alpha 3 \cdot 0^2 + \alpha 4 \cdot (0)^3 + \frac{p \cdot 0^4}{24 \cdot EI} = 0$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot 0 + \frac{p \cdot 0^2}{2 \cdot EI} = -M_{ik}$$

$$2 \cdot \alpha 3 + 6 \cdot \alpha 4 \cdot L + \frac{p \cdot L^2}{2 \cdot EI} = M_{ki}$$

$$\alpha 1 + \alpha 2 \cdot L + \alpha 3 \cdot L^2 + \alpha 4 \cdot L^3 + \frac{p \cdot L^4}{24 \cdot EI} = 0$$

$$\text{Find}(\alpha 1, \alpha 2, \alpha 3, \alpha 4) \rightarrow \begin{pmatrix} 0 \\ \frac{L \cdot M_{ik}}{3} - \frac{L \cdot M_{ki}}{6} \\ -\frac{M_{ik}}{2} \\ \frac{M_{ik} + M_{ki}}{6 \cdot L} \end{pmatrix}$$

Konstante su:

$\alpha 1 := 0$ $\qquad \alpha 2 := \frac{L \cdot M_{ik}}{3} - \frac{L \cdot M_{ki}}{6}$

$\alpha 3 := -\frac{M_{ik}}{2}$ $\qquad \alpha 4 := \frac{M_{ik} + M_{ki}}{6 \cdot L}$

Elastična linija savijanja nosača:

$$v(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$v(x) \text{ simplify } \rightarrow -\frac{x \cdot (L - x) \cdot \left(L \cdot M_{ki} - 2 \cdot L \cdot M_{ik} + M_{ik} \cdot x + M_{ki} \cdot x\right)}{6 \cdot L}$$ .... v(x) (m)

$$\frac{d}{dx} v(x) \text{ simplify } \rightarrow L \cdot \left(\frac{M_{ik}}{3} - \frac{M_{ki}}{6}\right) + \frac{3 \cdot M_{ik} \cdot x^2 + 3 \cdot M_{ki} \cdot x^2}{6 \cdot L} - M_{ik} \cdot x$$ .. ϕ(x) (rad)

$$\frac{d^2}{dx^2} v(x) \text{ simplify } \rightarrow \frac{M_{ik} \cdot x + M_{ki} \cdot x}{L} - M_{ik}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v(x) \text{ simplify } \rightarrow \frac{M_{ik} + M_{ki}}{L}$$ .... V(x) (kN)

Podaci :

$x := 0, 0.1 .. 8$ $\quad L := 8$ m $\quad M_{ik} := 10$ kNm $\quad M_{ki} := -10$ kNm $\quad EI := 5.46 \cdot 10^4$ kNm^2

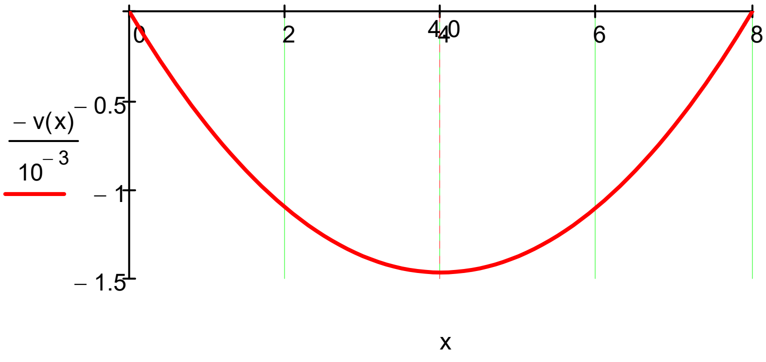
Konačne funkcije uticaja nosača:

$$v(x) := -\frac{x \cdot (L - x) \cdot \left(L \cdot M_{ki} - 2 \cdot L \cdot M_{ik} + M_{ik} \cdot x + M_{ki} \cdot x\right)}{6 \cdot L} \cdot \frac{1}{EI}$$

$$\phi(x) := \left[L \cdot \left(\frac{M_{ik}}{3} - \frac{M_{ki}}{6}\right) + \frac{3 \cdot M_{ik} \cdot x^2 + 3 \cdot M_{ki} \cdot x^2}{6 \cdot L} - M_{ik} \cdot x\right] \cdot \frac{1}{EI}$$

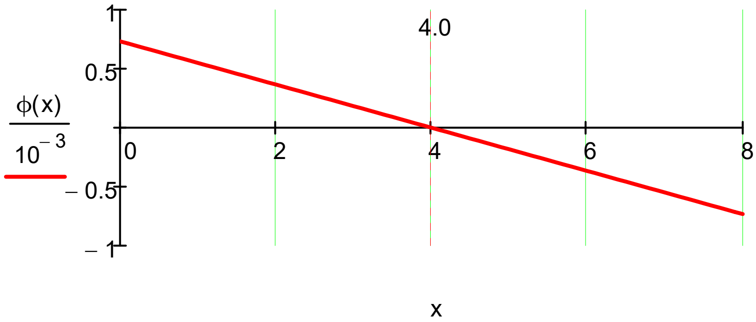
$$M(x) := \frac{M_{ik} \cdot x + M_{ki} \cdot x}{L} - M_{ik}$$

$$V(x) := \frac{M_{ik} + M_{ki}}{L}$$



(mm)

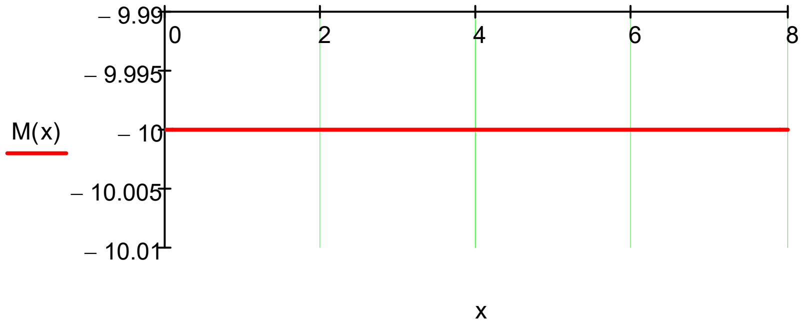
$$\frac{v\left(\frac{L}{2}\right)}{10^{-3}} = 1.47$$



(rad)

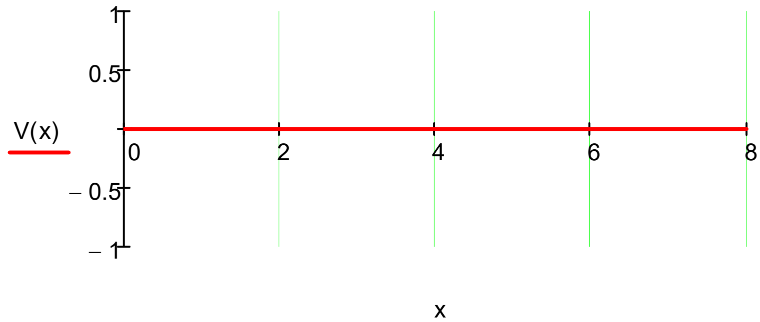
$\phi(0) = 0.00073$

$\phi(L) = -0.00073$



(kNm)

$M(L) = -10$

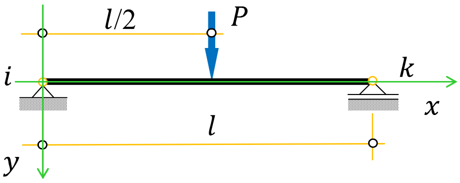


(kN)

$-V(0) = 0$

$V(L) = 0$

Štap tipa - PROSTA GREDA



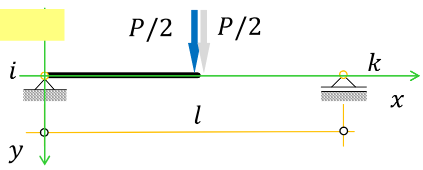
$$v(x) := \alpha 1 + \alpha 2\cdot x + \alpha 3\cdot x^2 + \alpha 4\cdot x^3 + \frac{p\cdot x^4}{24\cdot EI}$$

$$\frac{d}{dx}v(x) \rightarrow \alpha 2 + 3\cdot\alpha 4\cdot x^2 + 2\cdot\alpha 3\cdot x + \frac{p\cdot x^3}{6\cdot EI}$$ .... $\phi(x)$ (rad)

$$\frac{d^2}{dx^2}v(x) \rightarrow 2\cdot\alpha 3 + 6\cdot\alpha 4\cdot x + \frac{p\cdot x^2}{2\cdot EI}$$ .... M(x) (kNm)

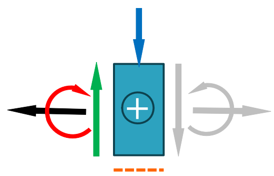
$$\frac{d^3}{dx^3}v(x) \rightarrow 6\cdot\alpha 4 + \frac{p\cdot x}{EI}$$ .... V(x) (kN)

Konturni uslovi leve polovine nosača:



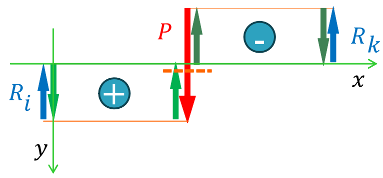
$v(0) = 0$ $\quad M(0) = 0$ $\quad V\left(\frac{L}{2}\right) = \frac{-P}{2}$ $\quad \phi\left(\frac{L}{2}\right) = 0$

Given $\quad p := 0$



$$\alpha 1 + \alpha 2\cdot 0 + \alpha 3\cdot 0^2 + \alpha 4\cdot(0)^3 + \frac{p\cdot 0^4}{24\cdot EI} = 0$$

$$2\cdot\alpha 3 + 6\cdot\alpha 4\cdot 0 + \frac{p\cdot 0^2}{2\cdot EI} = 0$$



$$6\cdot\alpha 4 + \frac{p\cdot\frac{L}{2}}{EI} = \frac{-P}{2}$$

$$\alpha 2 + 3\cdot\alpha 4\cdot\left(\frac{L}{2}\right)^2 + 2\cdot\alpha 3\cdot\frac{L}{2} + \frac{p\cdot\left(\frac{L}{2}\right)^3}{6\cdot EI} = 0$$

$$\text{Find}(\alpha 1, \alpha 2, \alpha 3, \alpha 4) \rightarrow \begin{pmatrix} 0 \\ \frac{L^2\cdot P}{16} \\ 0 \\ -\frac{P}{12} \end{pmatrix}$$

Konstante su:

$\alpha 1 := 0$ $\qquad \alpha 2 := \frac{L^2\cdot P}{16}$

$\alpha 3 := 0$ $\qquad \alpha 4 := -\frac{P}{12}$

Elastična linija savijanja leve polovine nosača:

$$v_L(x) := \alpha 1 + \alpha 2 \cdot x + \alpha 3 \cdot x^2 + \alpha 4 \cdot x^3 + \frac{p \cdot x^4}{24 \cdot EI}$$

$$v_L(x) \text{ simplify } \rightarrow \frac{P \cdot x \cdot \left(3 \cdot L^2 - 4 \cdot x^2\right)}{48}$$ .... v(x) (m)

$$\frac{d}{dx} v_L(x) \text{ simplify } \rightarrow \frac{P \cdot \left(L^2 - 4 \cdot x^2\right)}{16}$$ .. ϕ(x) (rad)

$$\frac{d^2}{dx^2} v_L(x) \text{ simplify } \rightarrow -\frac{P \cdot x}{2}$$ .... M(x) (kNm)

$$\frac{d^3}{dx^3} v_L(x) \text{ simplify } \rightarrow -\frac{P}{2}$$ .... V(x) (kN)

Podaci :

$x := 0, 0.1 .. 4$ $\quad L := 8 \text{ m}$ $\quad P := 10 \text{ kN}$ $\quad EI := 5.46 \cdot 10^4 \text{ kNm}^2$

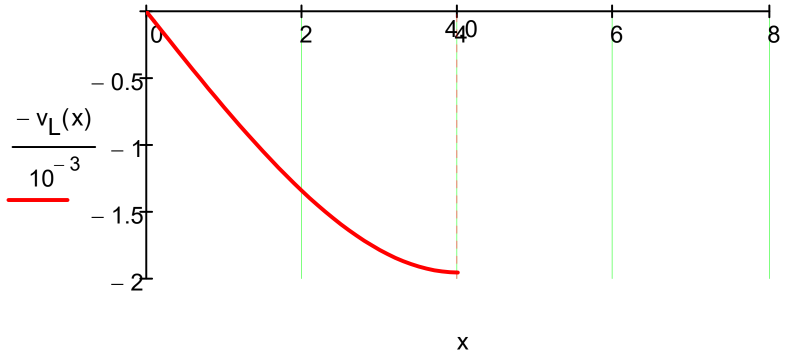
Konačne funkcije uticaja leve polovini nosača:

$$v_L(x) := \frac{P \cdot x \cdot \left(3 \cdot L^2 - 4 \cdot x^2\right)}{48} \cdot \frac{1}{EI}$$

$$\phi_L(x) := \frac{P \cdot \left(L^2 - 4 \cdot x^2\right)}{16} \cdot \frac{1}{EI}$$

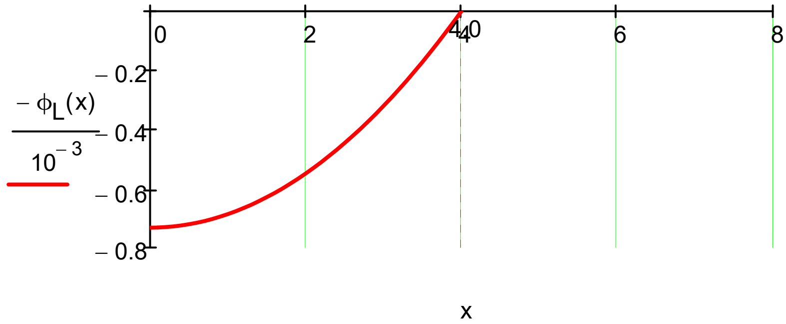
$$M_L(x) := -\frac{P \cdot x}{2}$$

$$V_L(x) := -\frac{P}{2}$$



(mm)

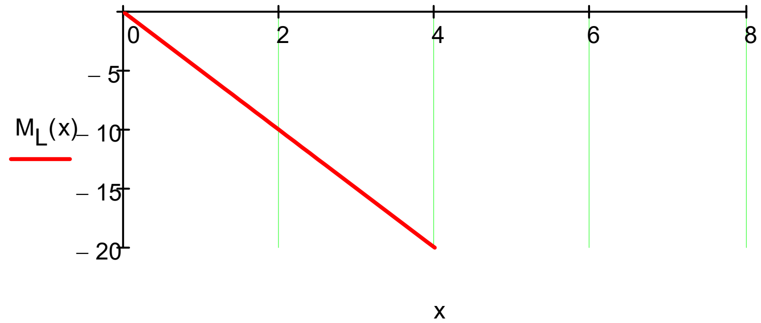
$$\frac{v_L\left(\frac{L}{2}\right)}{10^{-3}} = 1.95$$



(rad)

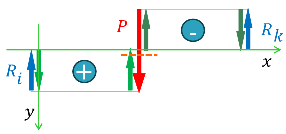
$$\phi_L(0) = 0.00073$$

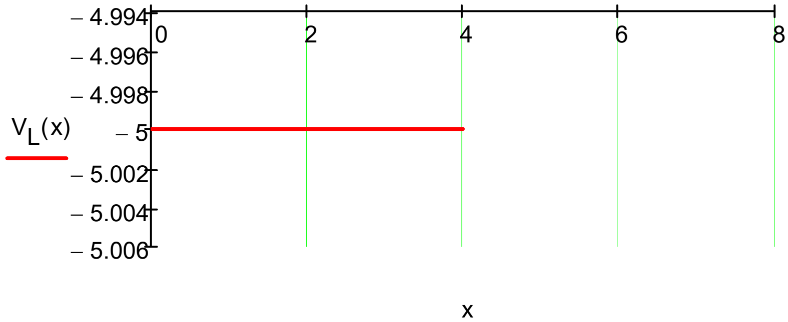
$$\phi_L\left(\frac{L}{2}\right) = 0$$



(kNm)

$$M_L\left(\frac{L}{2}\right) = -20$$



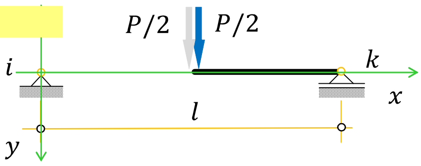


(kN)

$$-V_L(0) = 5$$

$$V_L\left(\frac{L}{2}\right) = -5$$

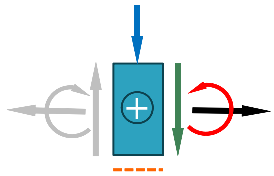
Konturni uslovi desne polovine nosača:



$$V\left(\frac{L}{2}\right) = \frac{P}{2} \qquad \phi\left(\frac{L}{2}\right) = 0 \qquad v(L) = 0 \qquad M(L) = 0$$

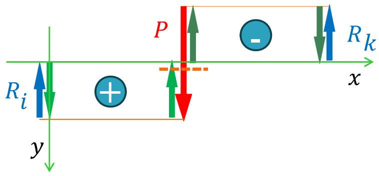
Given $\quad p := 0$

$$6\cdot\alpha 4 + \frac{p\cdot\frac{L}{2}}{EI} = \frac{P}{2}$$



$$\alpha 2 + 3\cdot\alpha 4\cdot\left(\frac{L}{2}\right)^2 + 2\cdot\alpha 3\cdot\frac{L}{2} + \frac{p\cdot\left(\frac{L}{2}\right)^3}{6\cdot EI} = 0$$

$$\alpha 1 + \alpha 2\cdot L + \alpha 3\cdot L^2 + \alpha 4\cdot(L)^3 + \frac{p\cdot L^4}{24\cdot EI} = 0$$



$$2\cdot\alpha 3 + 6\cdot\alpha 4\cdot L + \frac{p\cdot L^2}{2\cdot EI} = 0$$

Konstante su:

$$\alpha 1 := -\frac{L^3\cdot P}{48} \qquad \alpha 2 := \frac{3\cdot L^2\cdot P}{16} \qquad \alpha 3 := -\frac{L\cdot P}{4} \qquad \alpha 4 := \frac{P}{12}$$

Elastična linija desne polovine nosača:

$$v_D(x) := \alpha 1 + \alpha 2\cdot x + \alpha 3\cdot x^2 + \alpha 4\cdot x^3 + \frac{p\cdot x^4}{24\cdot EI}$$

Konačne funkcije uticaja desne polovine nosača:

$$v_D(x) := -\frac{P\cdot(L-x)\cdot\left(L^2 - 8\cdot L\cdot x + 4\cdot x^2\right)}{48}\cdot\frac{1}{EI} \qquad M_D(x) := -\frac{P\cdot(L-x)}{2}$$

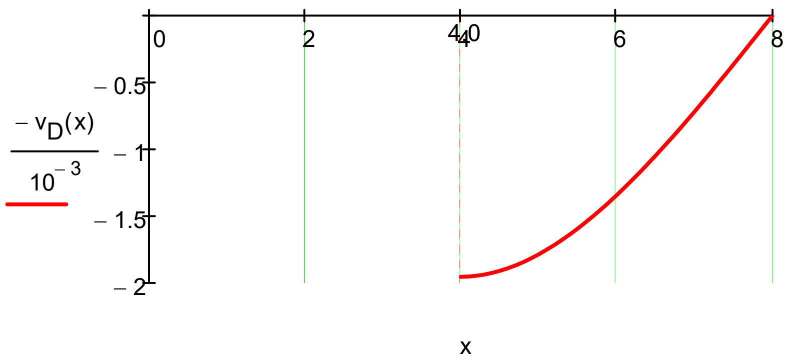
$$\phi_D(x) := \frac{P\cdot(L-2\cdot x)\cdot(3\cdot L-2\cdot x)}{16}\cdot\frac{1}{EI} \qquad V_D(x) := \frac{P}{2}$$

Funkcije uticaja u nosača:

$$v(x) := \begin{vmatrix} v_L(x) & \text{if} & x \le \frac{L}{2} \\ v_D(x) & \text{if} & \frac{L}{2} \le x \le L \end{vmatrix} \qquad M(x) := \begin{vmatrix} M_L(x) & \text{if} & x \le \frac{L}{2} \\ M_D(x) & \text{if} & \frac{L}{2} \le x \le L \end{vmatrix}$$

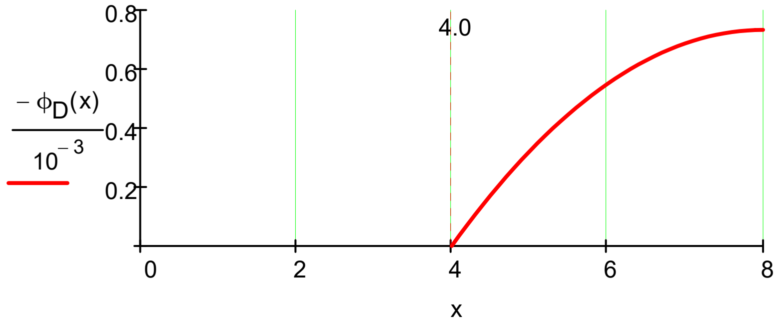
$$\phi(x) := \begin{vmatrix} \phi_L(x) & \text{if} & x \le \frac{L}{2} \\ \phi_D(x) & \text{if} & \frac{L}{2} \le x \le L \end{vmatrix} \qquad V(x) := \begin{vmatrix} V_L(x) & \text{if} & 0 \le x \le \frac{L}{2} \\ V_D(x) & \text{if} & \frac{L}{2} \le x \le L \end{vmatrix}$$

$x := 4, 4.1 .. 8$



(mm)

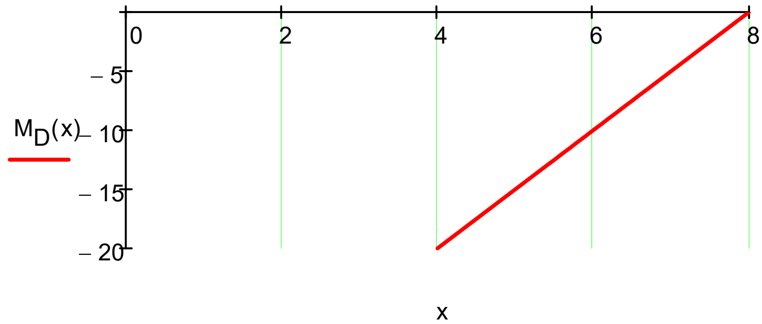
$$\frac{v_D\left(\frac{L}{2}\right)}{10^{-3}} = 1.95$$



(rad)

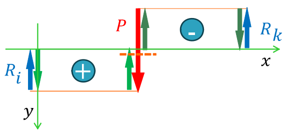
$$\phi_D\left(\frac{L}{2}\right) = 0$$

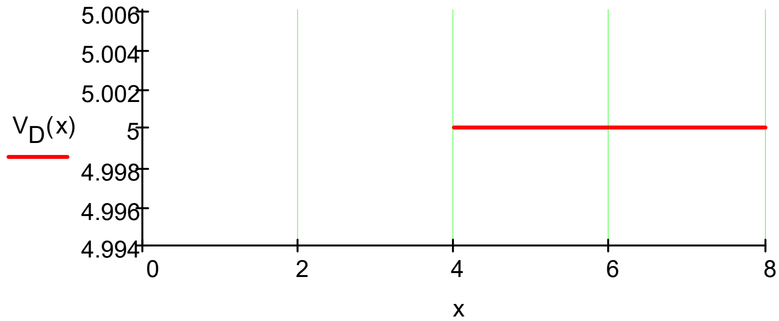
$$\phi_D(L) = -0.00073$$



(kNm)

$$M_D\left(\frac{L}{2}\right) = -20$$





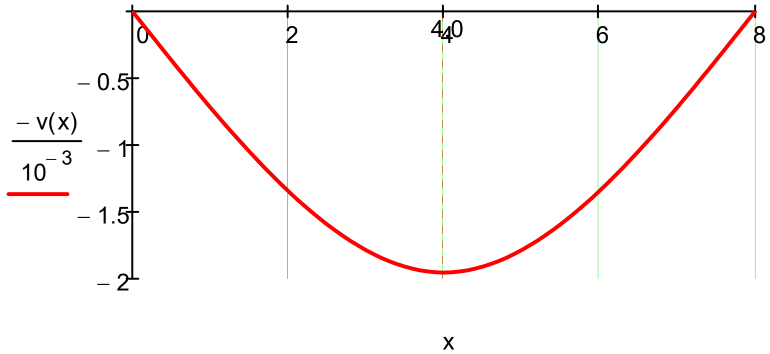
(kN)

$$-V_D\left(\frac{L}{2}\right) = -5$$

$$V_D(L) = 5$$

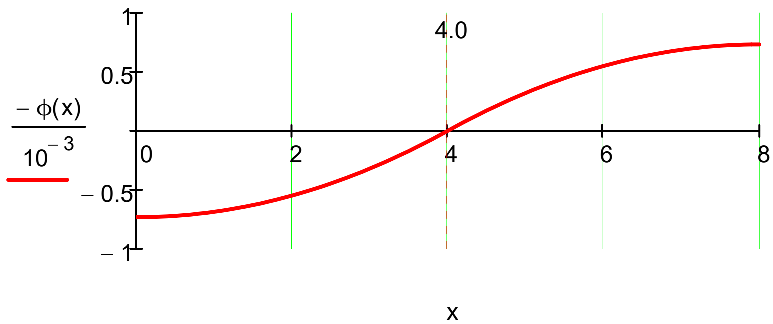
DIJAGRAMI PRESEČNIH UTICAJA U NOSAČU

$x := 0, 0.1 .. 8$



(mm)

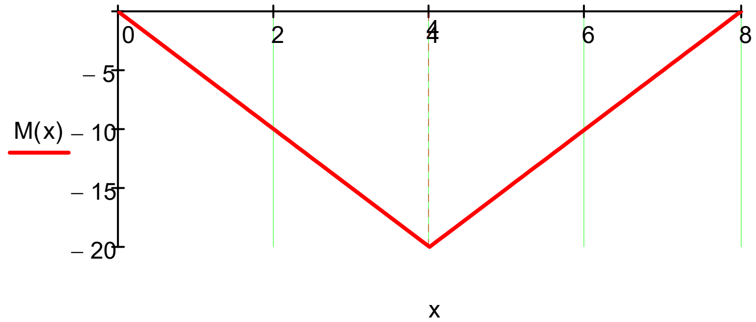
$$\frac{v\left(\frac{L}{2}\right)}{10^{-3}} = 1.95$$



(rad)

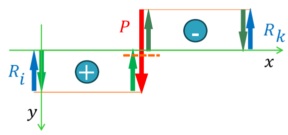
$\phi(0) = 0.00073$

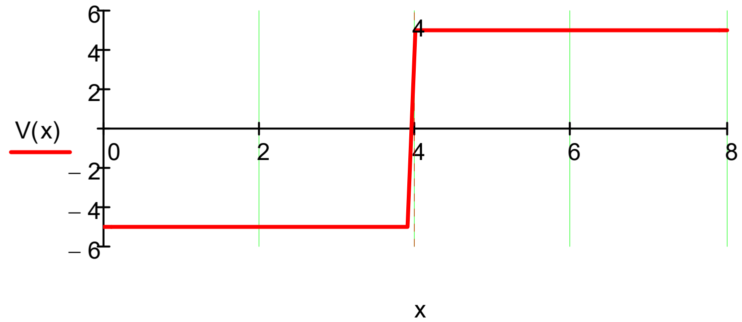
$\phi(L) = -0.00073$



(kNm)

$$M\left(\frac{L}{2}\right) = -20$$





(kN)

$-V(0) = 5$

$V(L) = 5$