

Tabulka 14.1. Deformace konzoly konstantního průřezu

Zatěž. případ	Schéma zatížení	Průhyb volného konce (w)	Pootočení volného konce (φ)
1		$\frac{Fa^2}{6EI}(3l-a)$	$\frac{Fa^2}{2EI}$
2		$\frac{Fl^3}{3EI}$	$\frac{Fl^2}{2EI}$
3		$\frac{q}{24EI}(3l^4 - 4a^3l + a^4)$	$\frac{q}{6EI}(l^3 - a^3)$
4		$\frac{qa^3}{24EI}(4l-a)$	$\frac{qa^3}{6EI}$
5		$\frac{ql^4}{8EI}$	$\frac{ql^3}{6EI}$
6		$\frac{ql^4}{30EI}$	$\frac{ql^3}{24EI}$
7		$\frac{11}{120} \frac{ql^4}{EI}$	$\frac{ql^3}{8EI}$
8		$\frac{qb}{30EI}[5(l-b)l^2 + b^3]$	$\frac{qb}{24EI}(6l^2 - 8lb + 3b^2)$
9		$\frac{qb}{120EI}[10(2l-b)l^2 + b^3]$	$\frac{qb}{24EI}(6l^2 - 4lb + b^2)$
10		$\frac{11}{192} \frac{ql^4}{EI}$	$\frac{7}{96} \frac{ql^3}{EI}$
11		$\frac{l^4}{120EI}(11q_1 + 4q_2)$	$\frac{l^3}{24EI}(3q_1 + q_2)$
12		$\frac{Ma}{2EI}(l+b)$	$\frac{Ma}{EI}$
13		$\frac{Ml^2}{2EI}$	$\frac{Ml}{EI}$

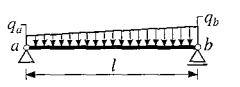
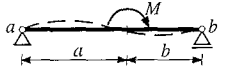
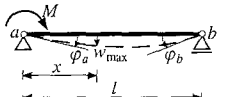
Tabulka 14.2. Deformace prostého nosníku konstantního průřezu

Zatěž. případ	Schéma zatížení	Průhyb w , w_{\max}	Pootočení φ_a, φ_b podporových průřezů a, b
1		$w_{\max} = \frac{Fab}{27EI} \sqrt{3a(l+b)^3}$ $v x = \sqrt{\frac{1}{3} a(l+b)}$ pro $a \geq \frac{l}{2}$	$\varphi_a = \frac{Fab}{6EI} (l+b)$ $\varphi_b = \frac{Fab}{6EI} (l+a)$
2		$w_{\max} = \frac{Fl^3}{48EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{Fl^2}{16EI}$
3		$w_{\max} = \frac{23}{648} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{Fl^2}{9EI}$
4		$w_{\max} = \frac{19}{384} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{5}{32} \frac{Fl^2}{EI}$
5		$w_{\max} = \frac{63}{1000} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{1}{5} \frac{Fl^2}{EI}$
6		$w_{\max} = \frac{11}{144} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{35}{144} \frac{Fl^2}{EI}$
7		$w_{\max} = \frac{F}{24EI} (3al^2 - 4a^3)$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{Fa}{2EI} (l-a)$
8		$w_{\max} = \frac{11}{384} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{3}{32} \frac{Fl^2}{EI}$
9		$w_{\max} = \frac{53}{1296} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{19}{144} \frac{Fl^2}{EI}$
10		$w_{\max} = \frac{41}{768} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{11}{64} \frac{Fl^2}{EI}$
11		$w_{\max} = \frac{397}{6000} \frac{Fl^3}{EI}$ v $x = 0,5l$	$\varphi_a = \varphi_b = \frac{51}{240} \frac{Fl^2}{EI}$
12		$w = \frac{qa^3b}{24EI} (4l - 3a)$ v $x = a$	$\varphi_a = \frac{qa^2}{24EI} (2l - a)^2$ $\varphi_b = \frac{qa^2}{24EI} (2l^2 - a^2)$
13		$w = \frac{qc}{6EI} \left[\frac{ab}{l} (2al - 2a^2 - \frac{c^2}{4}) + \frac{c^3}{64} \right]$ v $x = a$	$\varphi_a = \frac{q}{24EI} \cdot \frac{bc}{l} [4a(l+b) - c^2]$ $\varphi_b = \frac{q}{24EI} \cdot \frac{ac}{l} [4b(l+a) - c^2]$

Tabulka 14.2. Deformace prostého nosníku konstantního průřezu (pokračování)

Zatěž. případ	Schéma zatížení	Průhyb w, w_{\max}	Pootočení φ_a, φ_b podporových průřezů a, b
14		$w_{\max} = \frac{ql^4}{48EI} \cdot \frac{a^2}{l^2} \left(3 - 2 \frac{a^2}{l^2} \right)$ $v x = 0,5l$	$\varphi_a = \varphi_b = \frac{qa^2}{12EI} (3l - 2a)$
15		$w_{\max} = \frac{5}{384} \frac{ql^4}{EI} \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{1}{24} \frac{ql^3}{EI}$
16		$w = \frac{qa^3l}{45EI} \left(5 - 9 \frac{a}{l} + 4 \frac{a^2}{l^2} \right)$ $v x = a$	$\varphi_a = \frac{qa^2l}{360EI} \left(40 - 45 \frac{a}{l} + 12 \frac{a^2}{l^2} \right)$ $\varphi_b = \frac{qa^2l}{90EI} \left(5 - 3 \frac{a^2}{l^2} \right)$
17		$w = \frac{qa^2bl}{360EI} \left(20 \frac{a}{l} - 13 \frac{a^2}{l^2} \right)$ $v x = a$	$\varphi_a = \frac{qa^2l}{360EI} \left(20 - 15 \frac{a}{l} + 3 \frac{a^2}{l^2} \right)$ $\varphi_b = \frac{qa^2l}{360EI} \left(10 - 3 \frac{a^2}{l^2} \right)$
18		$w_{\max} = 0,006522 \frac{ql^4}{EI}$ $v x = 0,5193l$	$\varphi_a = \frac{7}{360} \frac{ql^3}{EI}$ $\varphi_b = \frac{8}{360} \frac{ql^3}{EI}$
19		$w_{\max} = \frac{1}{120} \frac{ql^4}{EI} \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{5}{192} \frac{ql^3}{EI}$
20		$w_{\max} = \frac{3}{640} \frac{ql^4}{EI} \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{1}{64} \frac{ql^3}{EI}$
21		$w_{\max} = \frac{7}{1024} \frac{ql^4}{EI} \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{17}{768} \frac{ql^3}{EI}$
22		$w_{\max} = \frac{19}{3072} \frac{ql^4}{EI} \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{5}{256} \frac{ql^3}{EI}$
23		$w_{\max} = \frac{5}{384} \frac{ql^4}{EI}$ $\left(1 - \frac{8a^2}{5l^2} + \frac{16a^4}{25l^4} \right) \quad v x = 0,5l$	$\varphi_a = \varphi_b = \frac{ql^3}{24EI} \left(1 - 2 \frac{a^2}{l^2} + \frac{a^3}{l^3} \right)$

Tabulka 14.2. Deformace prostého nosníku konstantního průřezu (pokračování)

Zatěž. případ	Schéma zatížení	Průhyb w , w_{\max}	Pootočení φ_a , φ_b podporových průřezů a , b
24		$w = \frac{5}{768} (q_a + q_b) \frac{l^4}{EI} \quad \vee x = 0,5l$	$\varphi_a = \frac{l^3}{360EI} (8q_a + 7q_b)$ $\varphi_b = \frac{l^3}{360EI} (7q_a + 8q_b)$
25		$w = -\frac{Mab}{3EI} \cdot \frac{a-b}{l} \quad \vee x = a$	$\varphi_a = \frac{-Ml}{6EI} \left(1 - 3 \frac{b^2}{l^2} \right)$ $\varphi_b = \frac{Ml}{6EI} \left(1 - 3 \frac{a^2}{l^2} \right)$
26		$w_{\max} = 0,06415 \frac{Ml^2}{EI}$ $\vee x = 0,42265l$	$\varphi_a = \frac{Ml}{3EI}, \quad \varphi_b = \frac{Ml}{6EI}$

Tabulka 14.3. Hodnoty integrálů $\int MMdx$ u prutů konstantního průřezu

Zatěž. případ	M	\bar{M}	\bar{M}_a	\bar{M}_b	
1			$\frac{1}{2} M_a \bar{M}_a l$	$\frac{1}{3} \bar{M}_a M_a l$	$\frac{1}{6} M_a (2\bar{M}_a + \bar{M}_b) l$
2			$\frac{1}{2} \bar{M}_a M_b l$	$\frac{1}{6} \bar{M}_a M_b l$	$\frac{1}{6} M_b (\bar{M}_a + 2\bar{M}_b) l$
3			$\frac{1}{2} (M_a + M_b) \bar{M}_a l$	$\frac{1}{6} (2M_a + M_b) \bar{M}_a l$	$\frac{1}{6} [\bar{M}_a (2M_a + M_b) + \bar{M}_b (M_a + 2M_b)] l$
4			$\frac{1}{2} (M_a - M_b) \bar{M}_a l$	$\frac{1}{6} (2M_a - M_b) \bar{M}_a l$	$\frac{1}{6} [\bar{M}_a (2M_a - M_b) + \bar{M}_b (M_a - 2M_b)] l$
5			$\frac{1}{2} \bar{M}_a M_c l$	$\frac{1}{6} \bar{M}_a M_c (l + x')$	$\frac{1}{6} [\bar{M}_a (l + x') + \bar{M}_b (l + x)] M_c$
6			$\frac{1}{2} \bar{M}_a M_c (x - x')$	$\frac{1}{6} \bar{M}_a M_c (l^2 - 3x'^2)$	$\frac{M_c}{6l} [\bar{M}_b (3x'^2 - l^2) - \bar{M}_a (3x'^2 - l^2)]$
7			$M_a \bar{M}_a l$	$\frac{1}{2} \bar{M}_a M_a l$	$\frac{1}{2} (\bar{M}_a + \bar{M}_b) M_a l$
8			$\frac{2}{3} \bar{M}_a M_c l$	$\frac{1}{3} \bar{M}_a M_c l$	$\frac{1}{3} M_c (\bar{M}_a + \bar{M}_b) l$
9			$\frac{1}{3} \bar{M}_a M_a l$	$\frac{1}{4} \bar{M}_a M_a l$	$\frac{1}{12} M_a (3\bar{M}_a + \bar{M}_b) l$
10			$\frac{1}{3} \bar{M}_a M_b l$	$\frac{1}{12} \bar{M}_a M_b l$	$\frac{1}{12} M_b (\bar{M}_a + 3\bar{M}_b) l$
11			$\frac{2}{3} \bar{M}_a M_a l$	$\frac{5}{12} \bar{M}_a M_a l$	$\frac{1}{12} M_a (5\bar{M}_a + 3\bar{M}_b) l$
12			$\frac{2}{3} \bar{M}_a M_b l$	$\frac{1}{4} \bar{M}_a M_b l$	$\frac{1}{12} M_b (3\bar{M}_a + 5\bar{M}_b) l$
13			$\frac{1}{2} \bar{M}_a M_a x$	$\frac{1}{6} \bar{M}_a M_a \frac{x}{l} (3l - x)$	$\frac{M_a}{6} \cdot \frac{x}{l} [\bar{M}_a (3l - x) + \bar{M}_b x]$
14			$\frac{1}{2} \bar{M}_a M_b x'$	$\frac{1}{6} \bar{M}_a M_b \frac{x'^2}{l}$	$\frac{M_b}{6} \cdot \frac{x'}{l} [\bar{M}_b (3l - x') + \bar{M}_a x']$
15			$\frac{1}{4} \bar{M}_a M_b l$	$\frac{1}{20} \bar{M}_a M_b l$	$\frac{M_b}{20} (\bar{M}_a + 4\bar{M}_b) l$
16			$\frac{1}{4} \bar{M}_a M_a l$	$\frac{1}{5} \bar{M}_a M_a l$	$\frac{M_a}{20} (4\bar{M}_a + \bar{M}_b) l$

Tabulka 14.3. Hodnoty integrálů $\int M\bar{M}dx$ u prutů konstantního průřezu (pokračování)

Zatěž. případ	\bar{M}	\bar{M}_a	\bar{M}_d	\bar{M}_b
17		$\frac{\bar{M}_a}{8}(M_a + 3M_c + 3M_d + M_b)l$	$\frac{\bar{M}_d}{120}(13M_a + 36M_c + 9M_d + 2M_b)l$	$\frac{l}{120}[\bar{M}_a \cdot (13M_a + 36M_c + 9M_d + 2M_b) + \bar{M}_b \cdot (2M_a + 9M_c + 36M_d + 13M_b)]$
Zatěž. případ	\bar{M}			
18		$\frac{1}{6}\bar{M}_c M_a(l + u')$	$\frac{1}{3}\bar{M}_c M_a l$	$\frac{1}{4}\bar{M}_a M_a l$
19		$\frac{1}{6}\bar{M}_c M_b(l + u)$	$\frac{1}{3}\bar{M}_c M_b l$	$\frac{1}{12}\bar{M}_a M_b l$
20		$\frac{\bar{M}_c}{6}[M_a(l + u') + M_b(l + u)]$	$\frac{1}{3}\bar{M}_c(M_a + M_b)l$	$\frac{1}{12}\bar{M}_a(3M_a + M_b)l$
21		$\frac{\bar{M}_c}{6}[M_a(l + u') - M_b(l + u)]$	$\frac{1}{3}\bar{M}_c(M_a - M_b)l$	$\frac{1}{12}\bar{M}_a(3M_a - M_b)l$
22		$\frac{\bar{M}_c M_c l}{6ux'} \cdot [2ux' - (x' - u)^2]$ pro $x < u$; $\frac{\bar{M}_c M_c l}{6ux} \cdot [2u'x - (u' - x)^2]$ pro $x > u$	$\frac{\bar{M}_c M_c}{3l}(l^2 + xx')$	$\frac{\bar{M}_a M_c}{12l}(3lx' + x^2)$
23		$\frac{\bar{M}_c M_c}{6}\left(l + u - \frac{3x'^2}{u}\right)$ pro $x > u$; $\frac{-\bar{M}_c M_c}{6}\left(l + u' - \frac{3x'^2}{u}\right)$ pro $x < u$	$-\frac{\bar{M}_c M_c}{3l} \cdot (l^3 - 6lx^2 + 4x^3)$	$\frac{\bar{M}_a M_c}{12l^2}(l^3 - 4x'^3)$

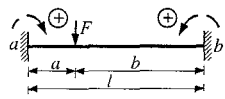
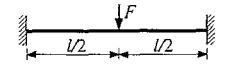
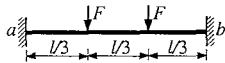
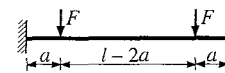
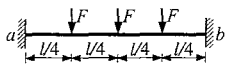
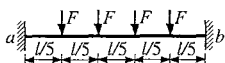
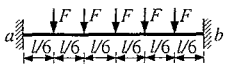
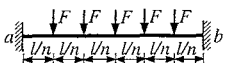

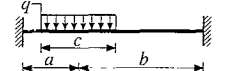
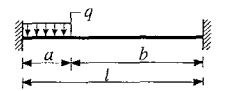
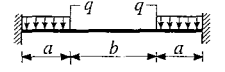
Tabulka 14.3. Hodnoty integrálů $\int M\bar{M}dx$ u prutů konstantního průřezu (pokračování)

Zatěž. případ	\bar{M}	\bar{M}_c	\bar{M}_c 2°	\bar{M}_a 2°
24		$\frac{1}{2}\bar{M}_c M_a l$	$\frac{2}{3}\bar{M}_c M_a l$	$\frac{1}{3}\bar{M}_a M_a l$
25		$\frac{\bar{M}_c M_c}{3l}(l^2 + ul)$	$\frac{8}{15}\bar{M}_c M_c l$	$\frac{1}{5}\bar{M}_a M_c l$
26		$\frac{\bar{M}_c M_a}{12l}(3lu + u^2)$	$\frac{1}{5}\bar{M}_c M_a l$	$\frac{1}{5}\bar{M}_a M_a l$
27		$\frac{\bar{M}_c M_b}{12l}(3lu + u^2)$	$\frac{1}{5}\bar{M}_c M_b l$	$\frac{1}{30}\bar{M}_a M_b l$
28		$\frac{\bar{M}_c M_a}{12l}(5l^2 - ul - u^2)$	$\frac{7}{15}\bar{M}_c M_a l$	$\frac{3}{10}\bar{M}_a M_a l$
29		$\frac{\bar{M}_c M_b}{12l}(5l^2 - ul - u^2)$	$\frac{7}{15}\bar{M}_c M_b l$	$\frac{2}{15}\bar{M}_a M_b l$

Tabulka 14.4. Podporový moment jednostranně dokonale vetknutého nosníku konstantního průřezu

Zatěž. případ	Schéma zatížení	M_{ba}	Zatěž. případ	Schéma zatížení	M_{ba}
1		$-\frac{Fab}{2l^2}(l+a)$	11		$-\frac{qa^2}{8l^2}(2l^2 - a^2)$
2		$-\frac{3}{16}Fl$	12		$-\frac{qb^2}{8l^2}(a+l)^2$
3		$-\frac{1}{3}Fl$	13		$-\frac{qac}{8l^2} \cdot [4(l^2 - a^2) - c^2]$
4		$-\frac{3}{2}Fa \frac{l-a}{l}$	14		$-\frac{qb}{16l}(3l^2 - b^2)$
5		$-\frac{15}{32}Fl$	15		$-\frac{1}{8}ql^2$
6		$-\frac{3}{5}Fl$	16		$-\frac{1}{15}ql^2$
7		$-\frac{Fl}{8} \frac{n^2 - 1}{n}$	17		$-\frac{7}{120}ql^2$
8		$-\frac{M}{2l^2}(l^2 - 3a^2)$	18		$-\frac{5}{64}ql^2$
9		$-\frac{M}{2}$	19		$-\frac{3}{64}ql^2$
10		$-\frac{3}{2} \frac{E\alpha_l \Delta t_1}{h}$ $\Delta t_1 = \Delta t_d - \Delta t_h > 0$	20		$-\frac{q(l-a)}{8l} \cdot (a^2 + ab + l^2)$

Tabulka 14.5. Podporové momenty oboustranně dokonale vetknutého nosníku konstantního průřezu

Zatěž. případ	Schéma zatížení	M_{ab}	M_{ba}
1		$-\frac{Fab^2}{l^2}$	$-\frac{Fa^2b}{l^2}$
2		$-\frac{1}{8}Fl$	$-\frac{1}{8}Fl$
3		$-\frac{2}{9}Fl$	$-\frac{2}{9}Fl$
4		$-\frac{Fa}{l}(l-a)$	$-\frac{Fa}{l}(l-a)$
5		$-\frac{5}{16}Fl$	$-\frac{5}{16}Fl$
6		$-\frac{2}{5}Fl$	$-\frac{2}{5}Fl$
7		$-\frac{35}{72}Fl$	$-\frac{35}{72}Fl$
8		$-\frac{Fl}{12} \frac{n^2 - 1}{n}$	$-\frac{Fl}{12} \frac{n^2 - 1}{n}$
9		$\frac{Mb}{l^2}(2l-3b)$	$-\frac{Ma}{l^2}(2l-3a)$
10		$-\frac{qc}{12l^2}(12ab^2 + ac^2 - 2bc^2)$	$-\frac{qc}{12l^2}(12a^2b + bc^2 - 2ac^2)$
11		$-\frac{qa^2}{12l^2}(6b^2 + 3ab + al)$	$-\frac{qa^3}{12l^2}(3b + l)$
12		$-\frac{qa^2}{6l}(2l + b)$	$-\frac{qa^2}{6l}(2l + b)$

Tabulka 14.5. Podporové momenty oboustranně dokonale vetknutého nosníku konstantního průřezu (pokračování)

Zatěž. případ	Schéma zatížení	M_{ab}	M_{ba}
13		$-\frac{1}{12}ql^2$	$-\frac{1}{12}ql^2$
14		$-\frac{1}{30}ql^2$	$-\frac{1}{20}ql^2$
15		$-\frac{1}{20}ql^2$	$-\frac{1}{30}ql^2$
16		$-\frac{5}{96}ql^2$	$-\frac{5}{96}ql^2$
17		$-\frac{q}{30}\left(l^2 + bl + b^2 - \frac{3}{2}\frac{b^3}{l}\right)$	$-\frac{q}{30}\left(l^2 + al + a^2 - \frac{3}{2}\frac{a^3}{l}\right)$
18		$-\frac{1}{32}ql^2$	$-\frac{1}{32}ql^2$
19		$-\frac{qc}{60l^2}\left[10b^2(3a+c) + c^2(15a+10b+3c)+40abc\right]$	$-\frac{qc}{60l^2}\left[10a^2(3b+2c) + c^2(10a+5b+2c)+20abc\right]$
20		$-\frac{qc}{6l^2}\left[6ab^2+c^2(a-2b)\right]$	$-\frac{qc}{6l^2}\left[6a^2b+c^2(b-2a)\right]$
21		$-\frac{q(l-a)}{12l}(a^2+ab+l^2)$	$-\frac{q(l-a)}{12l}(a^2+ab+l^2)$
22		$-\left(\frac{q}{12} + \frac{p}{30}\right)l^2$	$-\left(\frac{q}{12} + \frac{p}{20}\right)l^2$
23		$-\frac{E\alpha_s\Delta t_1}{h}$	$-\frac{E\alpha_s\Delta t_1}{h}$

$$\Delta t_1 = \Delta t_d - \Delta t_h > 0$$