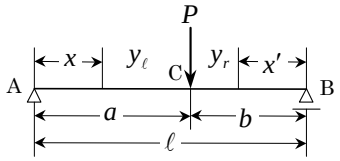
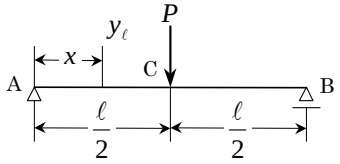
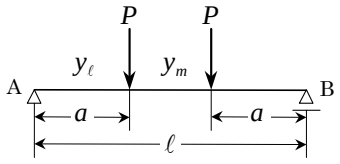
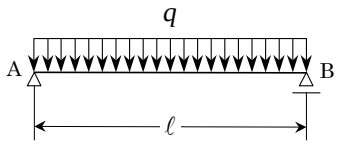
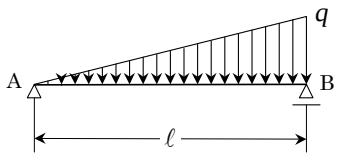
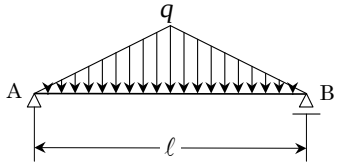
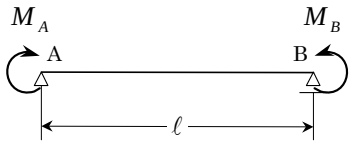
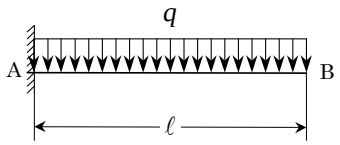
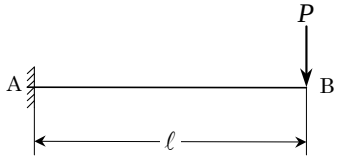
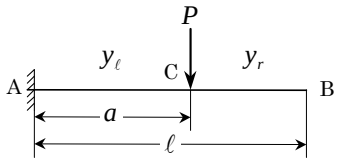
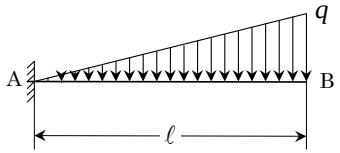
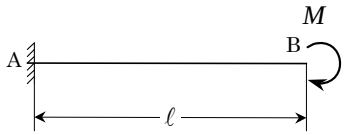
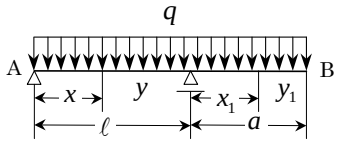
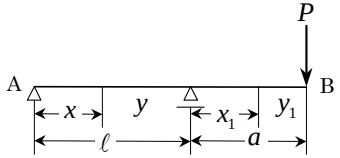
表-8.1(a)　各種はりのたわみおよびたわみ角

	荷重状態	たわみ曲線	特定点のたわみ角	特定点のたわみ
単純ばり①		$y_\ell = \dfrac{Pa^2b^2}{6EI\ell}\left(2\dfrac{x}{a}+\dfrac{x}{b}-\dfrac{x^3}{a^2b}\right)$ $y_r = \dfrac{Pa^2b^2}{6EI\ell}\left(2\dfrac{x'}{b}+\dfrac{x'}{a}-\dfrac{x'^3}{ab^2}\right)$	$\theta_A = \dfrac{P\ell^2}{6EI}\left(\dfrac{b}{\ell}-\dfrac{b^3}{\ell^3}\right)$ $\theta_B = -\dfrac{P\ell^2}{6EI}\left(\dfrac{a}{\ell}-\dfrac{a^3}{\ell^3}\right)$	$y_C = \dfrac{Pa^2b^2}{3EI\ell}$
単純ばり②		$y_\ell = \dfrac{P\ell^3}{16EI}\left(\dfrac{x}{\ell}-\dfrac{4}{3}\cdot\dfrac{x^3}{\ell^3}\right)\quad 0\leqq x\leqq\dfrac{\ell}{2}$	$\theta_\ell = \dfrac{P\ell^2}{16EI}\left(1-4\dfrac{x^2}{\ell^2}\right)\quad 0\leqq x\leqq\dfrac{\ell}{2}$ $\theta_A = -\theta_B = \dfrac{P\ell^2}{16EI}$	$y_{\max} = y_C = \dfrac{P\ell^3}{48EI}$
単純ばり③		$y_\ell = \dfrac{P\ell^2 x}{6EI}\left[3\left(\dfrac{a}{\ell}-\dfrac{a^2}{\ell^2}\right)-\dfrac{x^2}{\ell^2}\right]$ $y_m = \dfrac{P\ell^2 a}{6EI}\left[3\left(\dfrac{x}{\ell}-\dfrac{x^2}{\ell^2}\right)-\dfrac{a^2}{\ell^2}\right]$	$\theta_A = -\theta_B = \dfrac{P\ell a}{2EI}\left(1-\dfrac{a}{\ell}\right)$	$y_{\max} = y_{x=\frac{\ell}{2}} = \dfrac{P\ell^2 a}{24EI}\left(3-4\dfrac{a^2}{\ell^2}\right)$
単純ばり④		$y = \dfrac{q\ell^4}{24EI}\left(\dfrac{x}{\ell}-2\dfrac{x^3}{\ell^3}+\dfrac{x^4}{\ell^4}\right)$	$\theta = \dfrac{q\ell^3}{24EI}\left(1-6\dfrac{x^2}{\ell^2}+\dfrac{x^3}{\ell^3}\right)$ $\theta_A = -\theta_B = \dfrac{q\ell^3}{24EI}$	$y_{\max} = y_{x=\frac{\ell}{2}} = \dfrac{5}{384}\cdot\dfrac{q\ell^4}{EI}$
単純ばり⑤		$y = \dfrac{q\ell^4}{360EI}\left(7\dfrac{x}{\ell}-10\dfrac{x^3}{\ell^3}+3\dfrac{x^5}{\ell^5}\right)$	$\theta = \dfrac{q\ell^3}{360EI}\left(7-30\dfrac{x^2}{\ell^2}+15\dfrac{x^4}{\ell^4}\right)$ $\theta_A = \dfrac{7}{360}\cdot\dfrac{q\ell^3}{EI},\quad \theta_B = -\dfrac{8}{360}\cdot\dfrac{q\ell^3}{EI}$	$y_{\max} = \dfrac{5}{768}\cdot\dfrac{q\ell^4}{EI}$ $\left(x = \sqrt{\dfrac{15-2\sqrt{30}}{15}}\ell = 0.519329622\cdots\ell \cong 0.5193\ell\right)$
単純ばり⑥		$y = \dfrac{q\ell^4}{24EI}\left(\dfrac{5}{8}\cdot\dfrac{x}{\ell}-\dfrac{x^3}{\ell^3}+\dfrac{2}{5}\cdot\dfrac{x^5}{\ell^5}\right)\quad 0\leqq x\leqq\dfrac{\ell}{2}$	$\theta = \dfrac{q\ell^3}{24EI}\left(\dfrac{5}{8}-3\dfrac{x^2}{\ell^2}+2\dfrac{x^4}{\ell^4}\right)\quad 0\leqq x\leqq\dfrac{\ell}{2}$ $\theta_A = -\theta_B = \dfrac{5}{192}\cdot\dfrac{q\ell^3}{EI}$	$y_{\max} = y_{x=\frac{\ell}{2}} = \dfrac{1}{120}\cdot\dfrac{q\ell^4}{EI}$
単純ばり⑦		$y = \dfrac{\ell^2}{6EI}\left[M_A\left(2\dfrac{x}{\ell}-3\dfrac{x^2}{\ell^2}+\dfrac{x^3}{\ell^3}\right)+M_B\left(\dfrac{x}{\ell}-\dfrac{x^3}{\ell^3}\right)\right]$	$\theta_A = \dfrac{\ell}{6EI}\left(2M_A+M_B\right)$ $\theta_B = \dfrac{-\ell}{6EI}\left(M_A+2M_B\right)$	$y_{x=\frac{\ell}{2}} = \dfrac{\ell^2}{16EI}\left(M_A+M_B\right)$

※小松定夫：構造解析学Ⅰ，丸善，pp.194~195【表 8.1(a)】に準拠

表-8.1(b)　各種はりのたわみおよびたわみ角

	荷重状態	たわみ曲線	特定点のたわみ角	特定点のたわみ
片持ばり①		$y=\dfrac{q\ell^4}{24EI}\left(6\dfrac{x^2}{\ell^2}-4\dfrac{x^3}{\ell^3}+\dfrac{x^4}{\ell^4}\right)$	$\theta=\dfrac{q\ell^3}{6EI}\left(3\dfrac{x}{\ell}-3\dfrac{x^2}{\ell^2}+\dfrac{x^3}{\ell^3}\right)$	$y_{\max}=y_B=\dfrac{1}{8}\cdot\dfrac{q\ell^4}{EI}$
片持ばり②		$y=\dfrac{P\ell^3}{6EI}\left(3\dfrac{x^2}{\ell^2}-\dfrac{x^3}{\ell^3}\right)$	$\theta=\dfrac{P\ell^2}{2EI}\left(2\dfrac{x}{\ell}-\dfrac{x^2}{\ell^2}\right)$	$y_{\max}=y_B=\dfrac{1}{3}\cdot\dfrac{P\ell^3}{EI}$
片持ばり③		$y_\ell=\dfrac{Pa^3}{6EI}\left(3\dfrac{x^2}{a^2}-\dfrac{x^3}{a^3}\right)\quad 0\leqq x\leqq a$ $y_r=\dfrac{Pa^3}{6EI}\left(3\dfrac{x}{a}-1\right)\quad a\leqq x\leqq\ell$	$\theta_\ell=\dfrac{Pa^2}{2EI}\left(2\dfrac{x}{a}-\dfrac{x^2}{a^2}\right)\quad 0\leqq x\leqq a$ $\theta_r=\dfrac{Pa^2}{2EI}\quad a\leqq x\leqq\ell$	$y_{\max}=y_B=\dfrac{Pa^3}{6EI}\left(3\dfrac{\ell}{a}-1\right)$
片持ばり④		$y=\dfrac{q\ell^4}{120EI}\left(20\dfrac{x^2}{\ell^2}-10\dfrac{x^3}{\ell^3}+\dfrac{x^5}{\ell^5}\right)$	$\theta=\dfrac{q\ell^3}{24EI}\left(8\dfrac{x}{\ell}-6\dfrac{x^2}{\ell^2}+\dfrac{x^4}{\ell^4}\right)$	$y_{\max}=y_B=\dfrac{11}{120}\cdot\dfrac{q\ell^4}{EI}$
片持ばり⑤		$y=\dfrac{M\ell^2}{2EI}\left(\dfrac{x}{\ell}\right)^2$	$\theta=\dfrac{M\ell}{EI}\cdot\dfrac{x}{\ell}$	$y_{\max}=y_B=\dfrac{M\ell^2}{2EI}$
張出ばり①		$y=\dfrac{q\ell^4}{24EI}\cdot\dfrac{x}{\ell}\cdot\left[1-2\dfrac{a^2}{\ell^2}-2\left(1-\dfrac{a^2}{\ell^2}\right)\cdot\dfrac{x^2}{\ell^2}+\dfrac{x^3}{\ell^3}\right]$ $y_1=\dfrac{q\ell^4}{24EI}\cdot\dfrac{x_1}{\ell}\cdot\left(4\dfrac{a^2}{\ell^2}-1+6\dfrac{a^2}{\ell^2}\cdot\dfrac{x_1}{\ell}-4\dfrac{a}{\ell}\cdot\dfrac{x_1^2}{\ell^2}+\dfrac{x_1^3}{\ell^3}\right)$	$\theta=\dfrac{q\ell^3}{24EI}\left[1-2\dfrac{a^2}{\ell^2}-6\left(1-\dfrac{a^2}{\ell^2}\right)\cdot\dfrac{x^2}{\ell^2}+4\dfrac{x^3}{\ell^3}\right]$ $\theta_1=\dfrac{q\ell^3}{24EI}\left(4\dfrac{a^2}{\ell^2}-1+12\dfrac{a^2}{\ell^2}\cdot\dfrac{x_1}{\ell}-12\dfrac{a}{\ell}\cdot\dfrac{x_1^2}{\ell^2}+4\dfrac{x_1^3}{\ell^3}\right)$	$y_{1\max}=\dfrac{q\ell^4}{24EI}\cdot\dfrac{a}{\ell}\cdot\left(3\dfrac{a^3}{\ell^3}+4\dfrac{a^2}{\ell^2}-1\right)$
張出ばり②		$y=-\dfrac{P\ell^3}{6EI}\cdot\dfrac{a}{\ell}\cdot\dfrac{x}{\ell}\cdot\left(1-\dfrac{x^2}{\ell^2}\right)$ $y_1=\dfrac{P\ell^3}{6EI}\cdot\dfrac{x_1}{\ell}\cdot\left(2\dfrac{a}{\ell}+3\dfrac{a}{\ell}\cdot\dfrac{x_1}{\ell}-\dfrac{x_1^2}{\ell^2}\right)$	$\theta=-\dfrac{P\ell^3}{6EI}\cdot\dfrac{a}{\ell}\cdot\left(1-3\dfrac{x^2}{\ell^2}\right)$ $\theta_1=\dfrac{P\ell^3}{6EI}\left(2\dfrac{a}{\ell}+6\dfrac{a}{\ell}\cdot\dfrac{x_1}{\ell}-3\dfrac{x_1^2}{\ell^2}\right)$	$\lvert y\rvert_{\max}=\dfrac{Pa\ell^2}{9\sqrt{3}EI}\quad\left(x=\dfrac{1}{\sqrt{3}}\ell\right)$ $y_{1\max}=y_B=\dfrac{Pa^2\ell}{3EI}\left(1+\dfrac{a}{\ell}\right)$

※小松定夫：構造解析学Ⅰ，丸善，pp.196~197【表 8.1(b)】に準拠