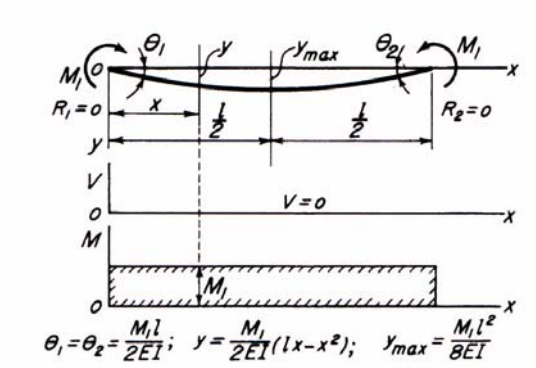
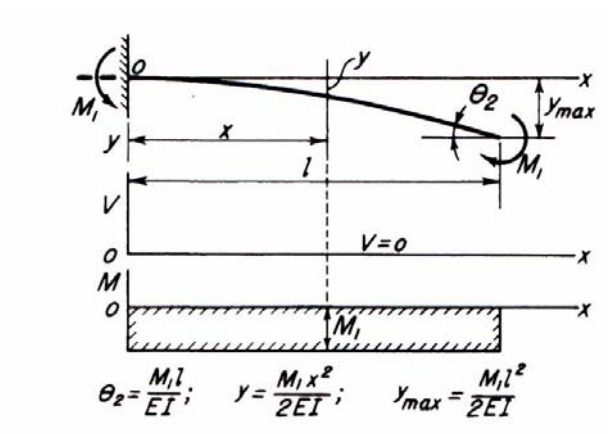
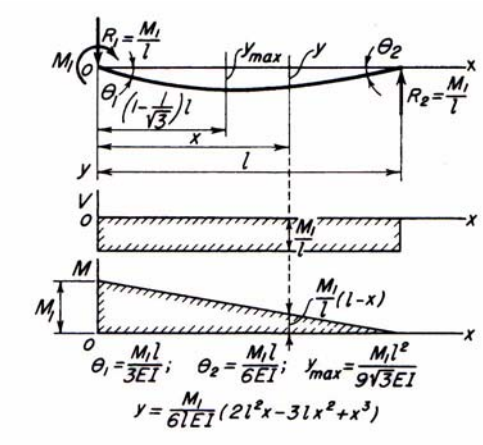
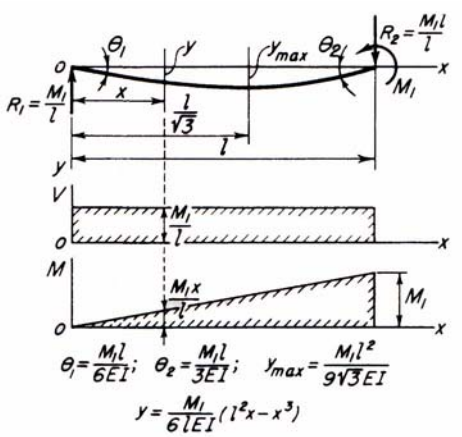
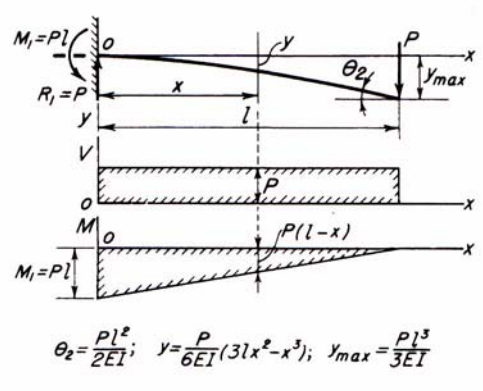
Διαγράμματα διατμητικών δυνάμεων και καμπτικών ροπών σε δοκούς διαφόρων φορτίσεων

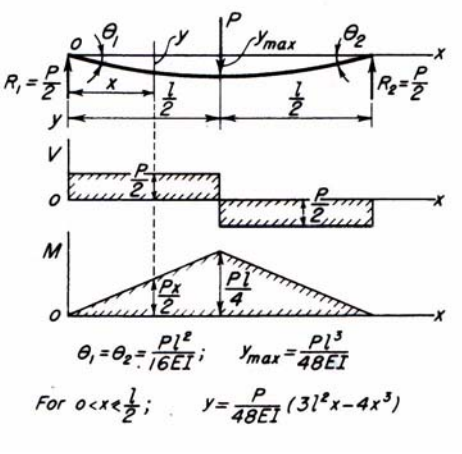


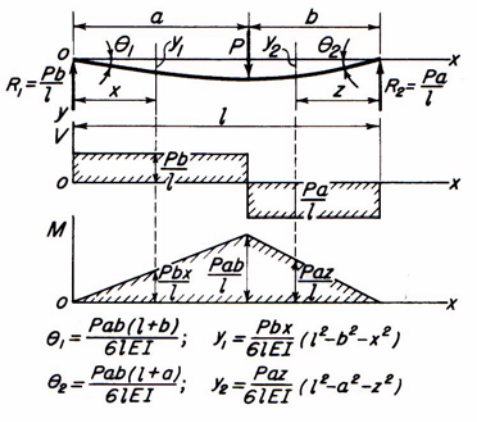






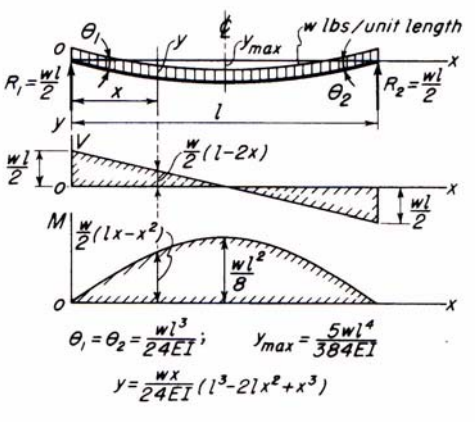






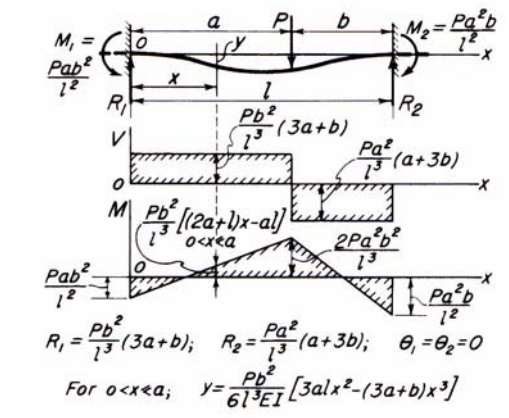
$$\theta_1=\frac{Pab(l+b)}{6lEI};\quad y_1=\frac{Pbx}{6lEI}(l^2-b^2-x^2)$$

$$\theta_2=\frac{Pab(l+a)}{6lEI};\quad y_2=\frac{Paz}{6lEI}(l^2-a^2-z^2)$$



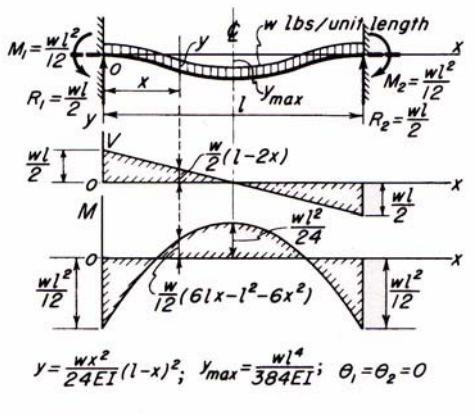
$$\theta_1=\theta_2=\frac{wl^3}{24EI};\qquad y_{max}=\frac{5wl^4}{384EI}$$

$$y=\frac{wx}{24EI}(l^3-2lx^2+x^3)$$

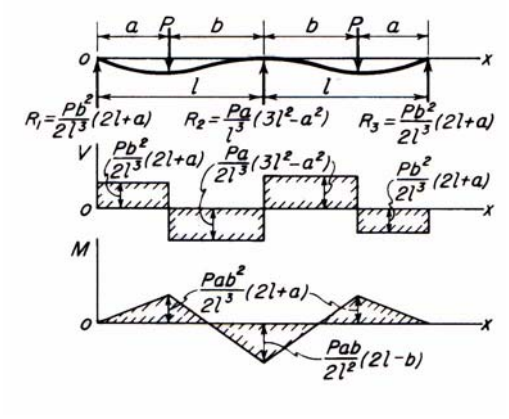


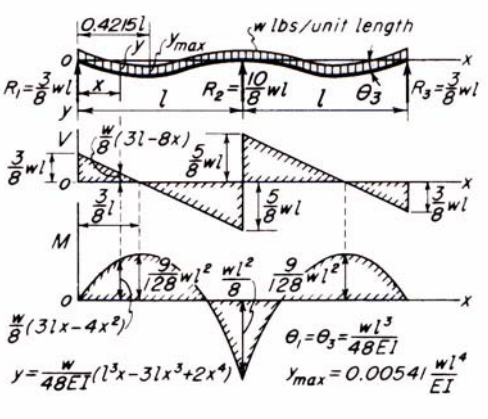
$$R_1=\frac{Pb^2}{l^3}(3a+b);\quad R_2=\frac{Pa^2}{l^3}(a+3b);\quad \theta_1=\theta_2=0$$

$$\text{For } 0<x\leq a;\quad y=\frac{Pb^2}{6l^3EI}[3alx^2-(3a+b)x^3]$$



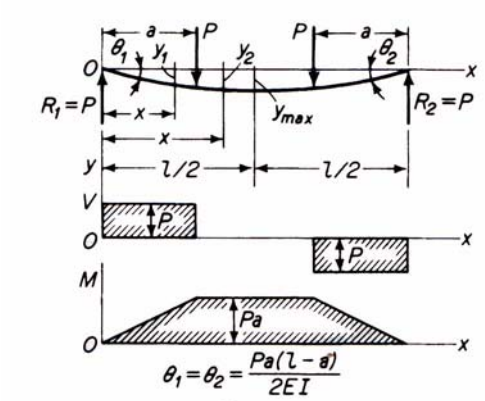
$$y=\frac{wx^2}{24EI}(l-x)^2;\quad y_{max}=\frac{wl^4}{384EI};\quad \theta_1=\theta_2=0$$





$$\theta_1=\theta_3=\frac{wl^3}{48EI}$$

$$y=\frac{w}{48EI}(l^3x-3lx^3+2x^4)\qquad y_{max}=0.0054l\frac{wl^4}{EI}$$

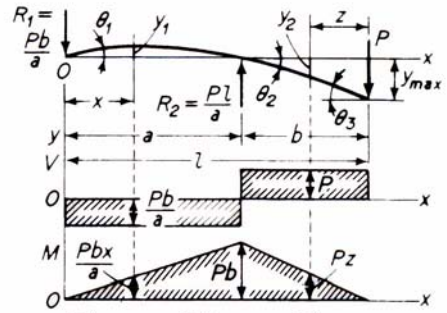


$$\theta_1 = \theta_2 = \frac{Pa(l-a)}{2EI}$$

For $o < x \leq a$, $y_1 = \frac{Px}{6EI}\left[3a(l-a) - x^2\right]$

For $a \leq x \leq (l-a)$, $y_2 = \frac{Pa}{6EI}\left[3x(l-x) - a^2\right]$

$$y_{max} = \frac{Pa}{24EI}\left(3l^2 - 4a^2\right)$$

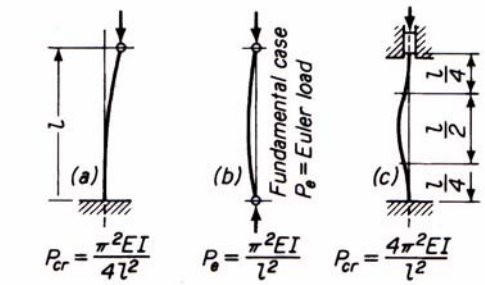


$$\theta_1 = \frac{Pab}{6EI}, \quad \theta_2 = \frac{Pab}{3EI}, \quad \theta_3 = \frac{Pb}{6EI}(2l + b)$$

For $o < x \leq a$; $y_1 = \frac{Pbx}{6aEI}\left(x^2 - a^2\right)$

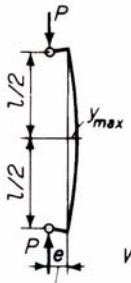
For $o < z \leq b$; $y_2 = \frac{P}{6EI}\left[z^3 - b(2l + b)z + 2b^2 l\right]$

$$y_{max} = \frac{Pb^2 l}{3EI}$$



$$P_{cr} = \frac{\pi^2 EI}{4l^2} \qquad P_e = \frac{\pi^2 EI}{l^2} \qquad P_{cr} = \frac{4\pi^2 EI}{l^2}$$

Critical or buckling loads for centrally loaded columns.



Eccentricity

$$y_{max} = e\left(\sec \frac{l}{2}\sqrt{\frac{P}{EI}} - 1\right)$$

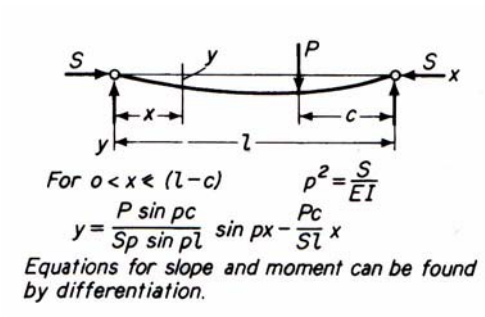
Maximum moment:

$$M_{max} = P(e + y_{max}) = Pe \sec \frac{l}{2}\sqrt{\frac{P}{EI}}$$

Maximum stress:

$$s_{max} = \frac{P}{A}\left(1 + \frac{ec}{i^2}\sec \frac{l}{2i}\sqrt{\frac{P}{AE}}\right)$$

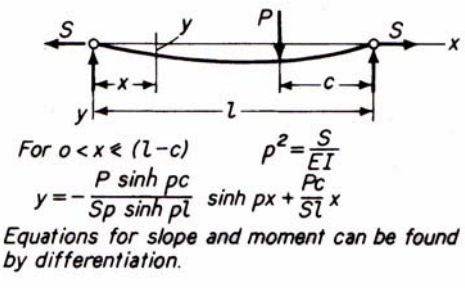
Where A = area of cross section
$i = \sqrt{I/A}$, radius of gyration
c = distance from neutral axis to edge of section



For $o < x \leq (l-c)$ $\qquad p^2 = \frac{S}{EI}$

$$y = \frac{P \sin pc}{Sp \sin pl} \sin px - \frac{Pc}{Sl}x$$

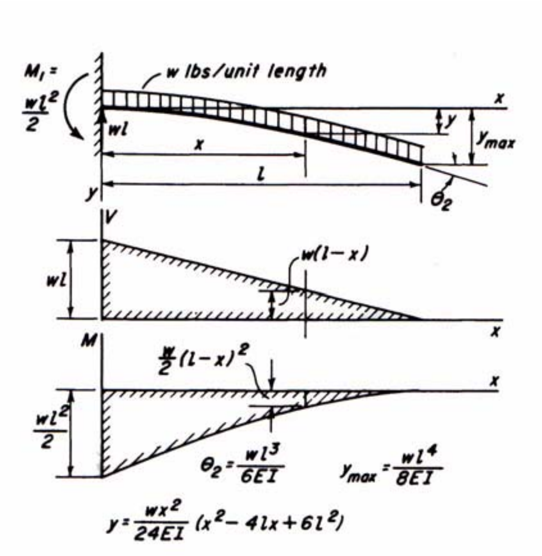
Equations for slope and moment can be found by differentiation.

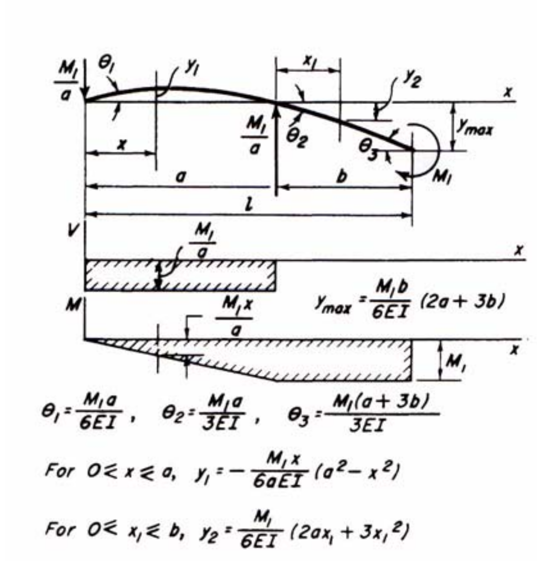


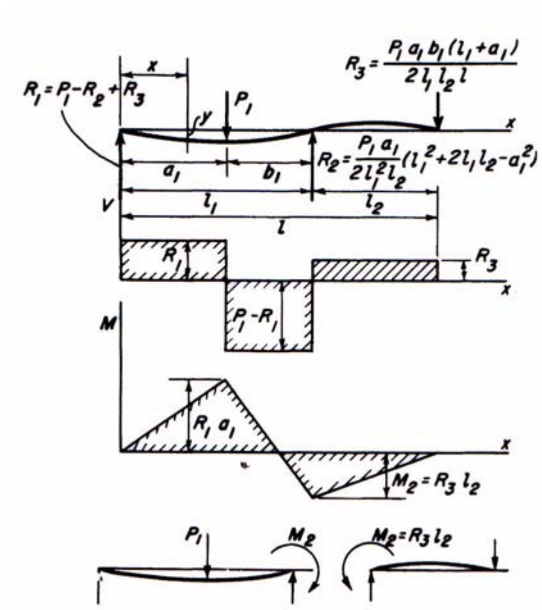
For $o < x \leq (l-c)$ $\qquad p^2 = \frac{S}{EI}$

$$y = -\frac{P \sinh pc}{Sp \sinh pl} \sinh px + \frac{Pc}{Sl}x$$

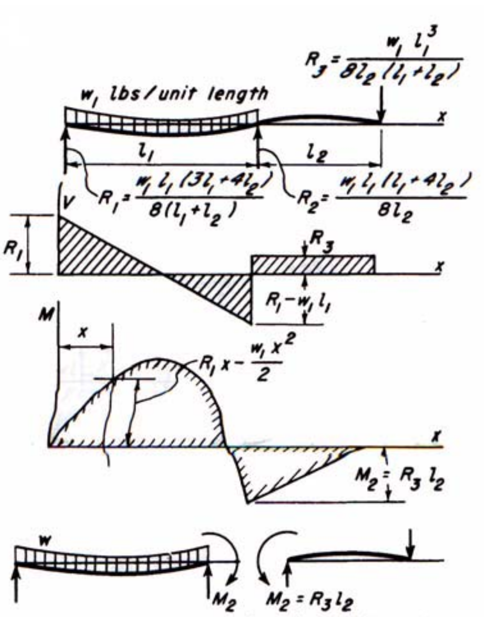
Equations for slope and moment can be found by differentiation.







Deflections can be found by elementary equations and superpositions



Deflections can be found by elementary equations and superposition