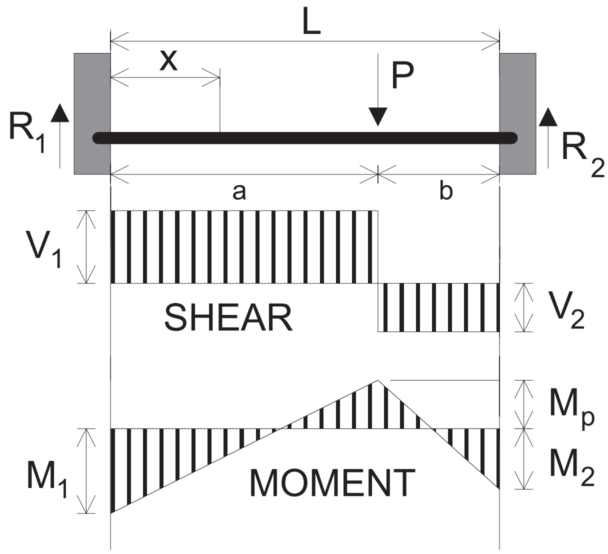


$R_1 = V_1$ (max. when a<b) = $\frac{Pb^2}{L^3}(3a + b)$

$R_2 = V_2$ (max. when a>b) = $\frac{Pa^2}{L^3}(a + 3b)$

M_1 (max. when a<b) = $\frac{Pab^2}{L^2}$

M_2 (max. when a>b) = $\frac{Pa^2b}{L^2}$

M_a (at point of load) = $\frac{2Pa^2b^2}{L^3}$

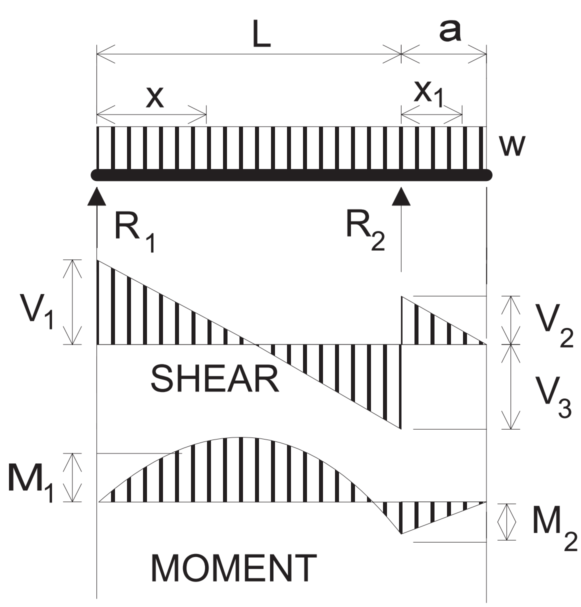
M_x (when x<a) = $R_1x - \frac{Pab^2}{L^2}$

Δ_{max} (when a>b at x = $\frac{2aL}{3a+b}$) = $\frac{2Pa^3b^2}{3EI(3a+b)^2}$

Δ_a (at point of load) = $\frac{Pa^3b^3}{3EIL^3}$

Δ_x (when x<a) = $\frac{Pb^2x^2}{6EIL^3}(3aL - 3ax - bx)$

Figure A.12 - Beam Fixed at Both Ends - Concentrated Load at Any Point



$R_1 = V_1 = \frac{w}{2L}(L^2 - a^2)$

$R_2 = V_2 + V_3 = \frac{w}{2L}(L + a)^2$

$V_2 = wa$

$V_3 = \frac{w}{2L}(L^2 + a^2)$

V_x (between supports) = $R_1 - wx$

V_{x1} (for overhang) = $w(a - x_1)$

M_1 (at x = $\frac{L}{2}\left[1 - \frac{a^2}{L^2}\right]$) = $\frac{w}{8L^2}(L+a)^2(L-a)^2$

M_2 (at R_2) = $\frac{wa^2}{2}$

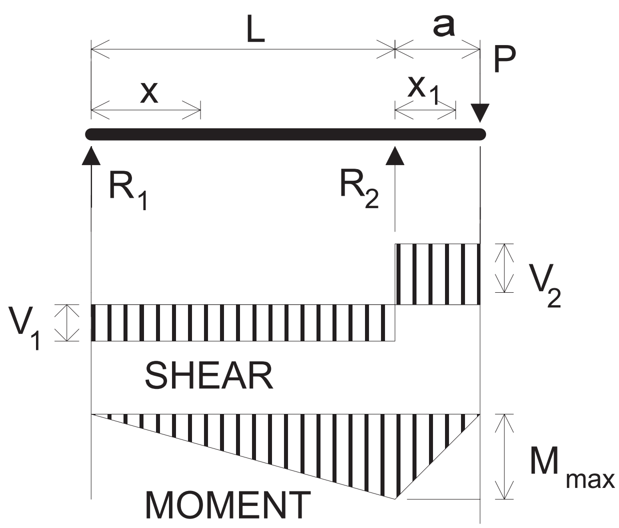
M_x (between supports) = $\frac{wx}{2L}(L^2 - a^2 - xL)$

M_{x1} (for overhang) = $\frac{w}{2}(a - x_1)^2$

Δ_x (between supports) = $\frac{24EIL}{wx}(L^4 - 2L^2x^2 + Lx^3 - 2a^2L^2 + 2a^2x^2)$

Δ_{x1} (for overhang) = $\frac{wx_1}{24EI}(4a^2L - L^3 + 6a^2x_1 - 4ax_1^2 + x_1^3)$

Figure A.13 - Beam Overhanging One Support - Uniformly Distributed Load



$R_1 = V_1 = \frac{Pa}{L}$

$R_2 = V_1 + V_2 = \frac{P}{L}(L + a)$

$V_2 = P$

M_{max} (at R_2) = Pa

M_x (between supports) = $\frac{Pax}{L}$

M_{x1} (for overhang) = $P(a - x_1)$

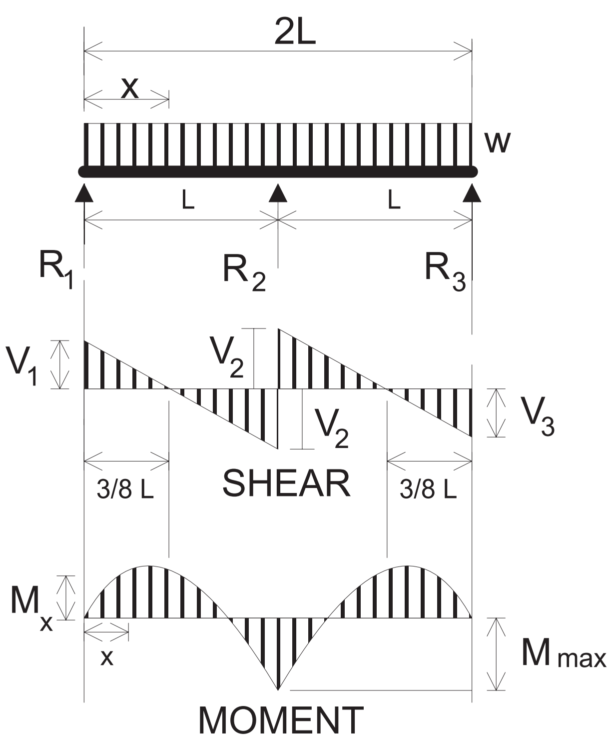
Δ_{max} (between supports at $x = \frac{L}{\sqrt{3}}$) = $\frac{PaL^2}{9\sqrt{3}EI}$

Δ_{max} (for overhang at $x_1 = a$) = $\frac{Pa^2}{3EI}(L + a)$

Δ_x (between supports) = $\frac{Pax}{6EIL}(L^2 - x^3)$

Δ_x (for overhang) = $\frac{Px_1}{6EI}(2aL + 3ax_1 - x_1^2)$

Figure A.14 - Beam Overhanging One Support - Concentrated Load at End of Overhang



$R_1 = V_1 = R_3 = V_3 = \frac{3wL}{8}$

$R_2 = \frac{10wL}{8}$

$V_2 = Vm = \frac{5wL}{8}$

$M_{max} = -\frac{wL^2}{8}$

M_1 [at $x = \frac{3L}{8}$] = $\frac{9wL^2}{128}$

M_x [at $x < L$] = $\frac{3wLx}{8} - \frac{wx^2}{2}$

Δ_{max} [at $x \cong 0.46L$] = $\frac{wL^4}{185EI}$

Figure A.15 - Continuous Beam - Two Equal Spans and Uniformly Distributed Load