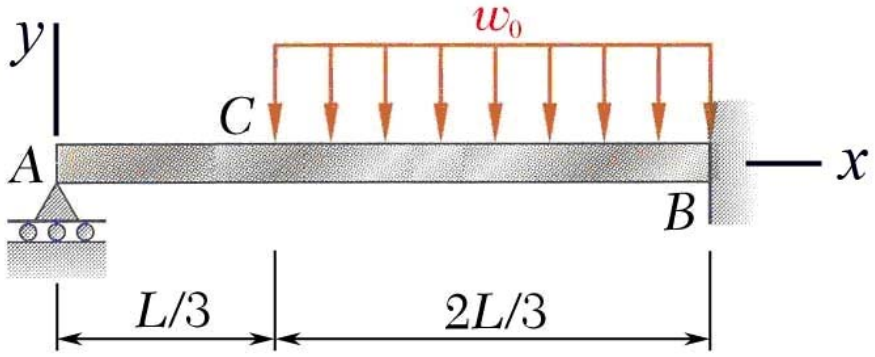
MEEG 3013 Quiz #8.m22.072

The beam shown has a constant *EI*. Using *singularity functions*, determine the reaction $\mathbf{A}_y$ at *A*.



$$q = A_y \langle x \rangle^{-1} - w_0 \langle x - \frac{L}{3} \rangle^{0}$$

$$V = A_y \langle x \rangle^{0} - w_0 \langle x - \frac{L}{3} \rangle^{1}$$

$$EIy'' = M = A_y \langle x \rangle^{1} - \frac{w_0}{2} \langle x - \frac{L}{3} \rangle^{2}$$

$$EIy' = \frac{A_y}{2} \langle x \rangle^{2} - \frac{w_0}{6} \langle x - \frac{L}{3} \rangle^{3} + C_1 \quad ①$$

$$EIy = \frac{A_y}{6} \langle x \rangle^{3} - \frac{w_0}{24} \langle x - \frac{L}{3} \rangle^{4} + C_1 x + C_2 \quad ①$$

Boundary conditions:

① $y(0) = 0$: $\quad 0 = C_2 \quad ②$

② $y(L) = 0$: $\quad 0 = \frac{A_y}{6} L^3 - \frac{w_0}{24} (2L/3)^4 + C_1 L \quad ②$

③ $y'(L) = 0$: $\quad 0 = \frac{A_y}{2} L^2 - \frac{w_0}{6} (2L/3)^3 + C_1 \quad ②$

$$C_1 = -\frac{w_0 L^3}{81} \qquad A_y = \frac{10 w_0 L}{81} \qquad \mathbf{A}_y = \frac{10 w_0 L}{81} \uparrow \quad ②$$