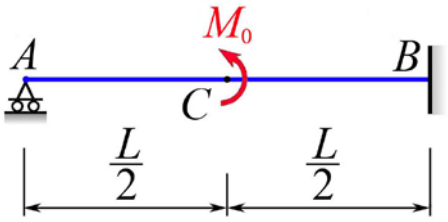
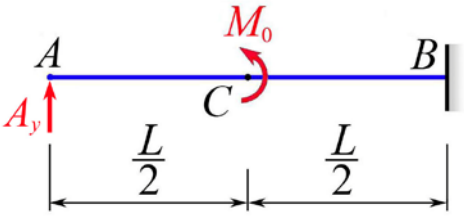
MEEG 3013 Quiz #8.m23.102

A beam with constant flexural rigidity *EI* is supported and loaded by a moment $\mathbf{M}_0$ as shown. Using *method of integration* with singularity functions, determine for this beam (*a*) the reaction $\mathbf{A}_y$ at *A*, (*b*) the deflection y_C at *C*.





$$q = A_y < x >^{-1} - M_0 < x - L/2 >^{-2}$$

$$V = A_y < x >^{0} - M_0 < x - L/2 >^{-1}$$

$$EIy'' = M = A_y < x >^{1} - M_0 < x - L/2 >^{0}$$

$$EIy' = \frac{A_y}{2} < x >^{2} - M_0 < x - L/2 >^{1} + C_1 \qquad ③$$

$$EIy = \frac{A_y}{6} < x >^{3} - \frac{M_0}{2} < x - L/2 >^{2} + C_1 x + C_2$$

B.C.1: $y(0) = 0$ ① B.C.2: $y'(L) = 0$ ① B.C.3: $y(L) = 0$ ①

$\therefore\ C_1 = -\frac{M_0 L}{16}$ ① $C_2 = 0$ ① $A_y = \frac{9M_0}{8L}$

$\mathbf{A}_y = \frac{9M_0}{8L} \uparrow$ ① $y_C = y(L/2) = -\frac{M_0 L^2}{128EI}$ $y_C = \frac{M_0 L^2}{128EI} \downarrow$ ①