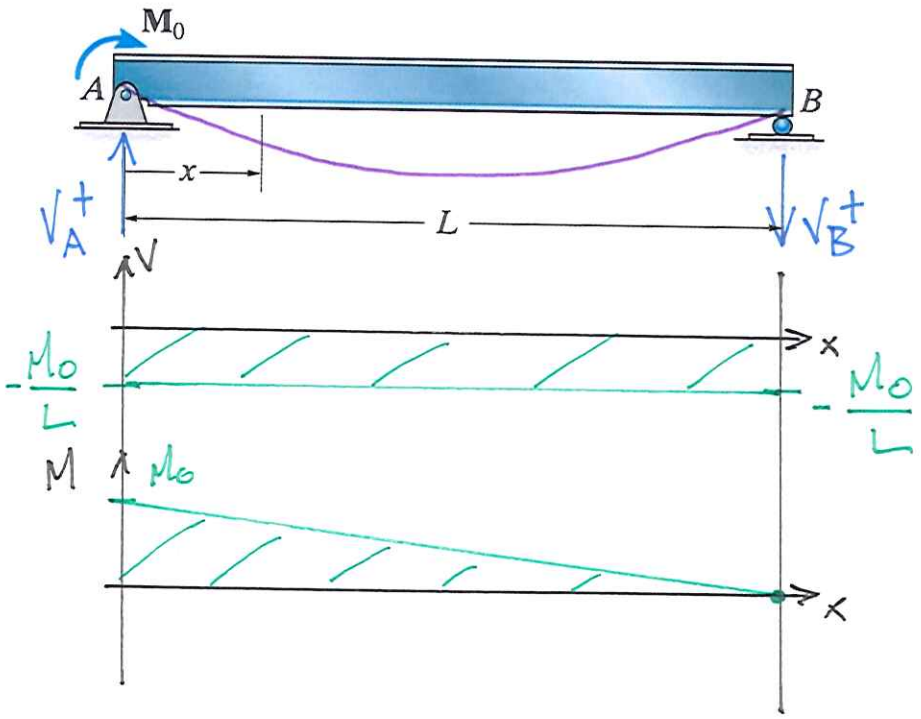
Example 7b-4: Use the conjugate beam method to determine the slope at point *B* and the displacement at $x = L/2$. Assume that *EI* is constant.



$$\circlearrowleft +\sum M_B = 0 = -M_0 - V_A L \qquad V_A = -\frac{M_0}{L}$$

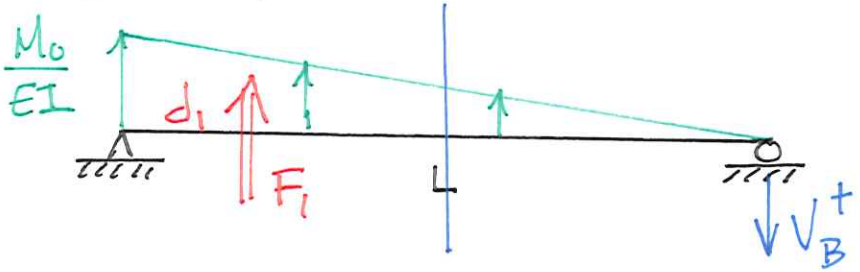
$$+\uparrow \sum F_y = 0 = V_A - V_B \qquad V_B = -\frac{M_0}{L}$$

$$\circlearrowleft +\sum M_A = 0 = F_1 d_1 - V_B(L)$$

$$= \frac{M_0 L}{2EI}\left(\frac{L}{3}\right) - V_B(L)$$

$$V_B = \frac{M_0 L}{6EI} \Longrightarrow \theta_B$$

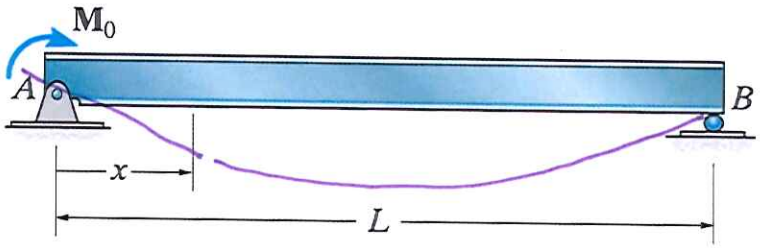
CONJUGATE BEAM

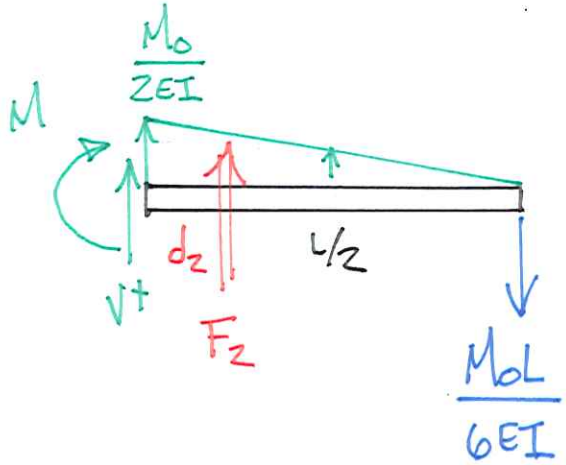


$$F_1 = \frac{1}{2}(L)\frac{M_0}{EI} = \frac{M_0 L}{2EI}$$

$$d_1 = \frac{L}{3}$$

Example 7b-4: Use the conjugate beam method to determine the slope at point *B* and the displacement at $x = L/2$. Assume that *EI* is constant.





$$+\circlearrowleft \sum M_{cut} = 0 = -M + F_2 d_2 - \frac{M_0 L}{6EI}\left(\frac{L}{2}\right)$$

$$M = \frac{M_0 L}{8EI}\left(\frac{L}{6}\right) - \frac{M_0 L^2}{12EI}$$

$$= -\frac{3M_0 L^2}{48EI} \Longrightarrow y_{x=L/2}$$

$$F_2 = \frac{1}{2}\left(\frac{L}{2}\right)\frac{M_0}{2EI} = \frac{M_0 L}{8EI}$$

$$d_2 = \frac{1}{3}\left(\frac{L}{2}\right) = \frac{L}{6}$$