FROM TABLE 5.3 (5)

$$\theta_B = \frac{1}{EA}\int_0^L P \cancel{\frac{\partial P}{\partial M_B}}^{\,0} dx \quad + \quad \frac{1}{EI}\int_0^L M \frac{\partial M}{\partial M_B} dx$$

$$= \frac{1}{EI}\left\{ \int_0^{L/2} (-aF)(-1)dx + \int_0^L \left[(L-x)R_{By} - M_B\right](-1)\, dx \right\}$$

$$= \frac{1}{EI}\left\{ \left[aFx\right]_0^{L/2} + \left[\left(-Lx + \frac{x^2}{2}\right)R_{By} + M_B x\right]_0^L \right\}$$

$$= \frac{1}{EI}\left\{ \frac{aFL}{2} + \left(-L^2 + \frac{L^2}{2}\right)R_{By} + M_B L \right\}$$

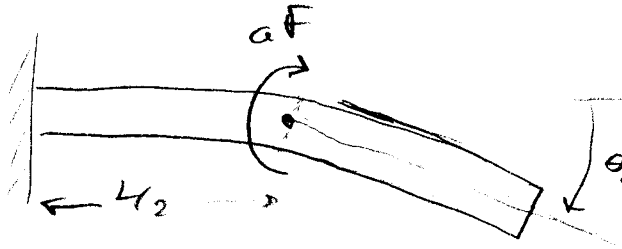
$$= \frac{L}{EI}\left\{ \frac{aF}{2} - \frac{L R_{By}}{2} + M_B \right\}$$

$$= \frac{L}{2EI}\left\{ aF - L R_{By} + 2M_B \right\}$$

$$\theta_B = 0 \implies \{\ \} = 0$$

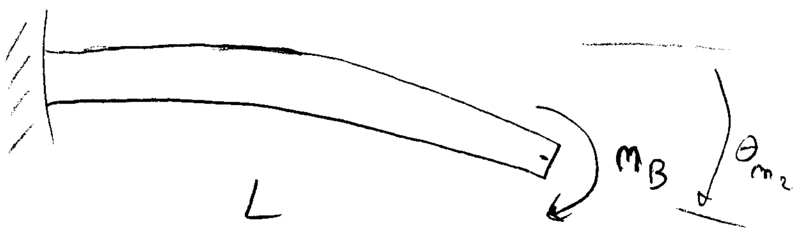
SUPERPOSITION CHECK

FROM APP D-1



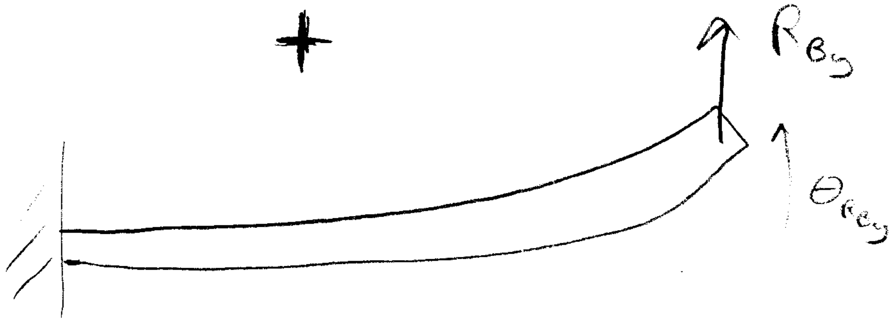
$$\theta_{aF} = \frac{(aF)(L/2)}{EI}$$

+



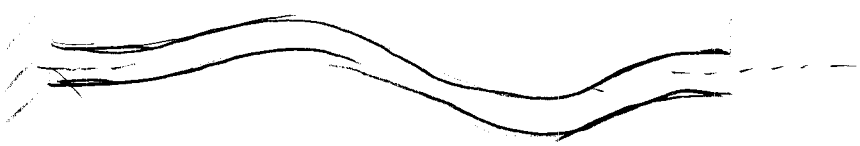
$$\theta_{M_B} = \frac{M_B L}{EI}$$

+



$$\theta_{R_{By}} = \frac{R_{By} L^2}{2EI}$$

=



$$\theta_B = \theta_{aF} + \theta_{M_B} - \theta_{R_{By}}$$

$$= \frac{L}{2EI}\left(aF + 2M_B - LR_{By}\right)$$

$$= 0$$