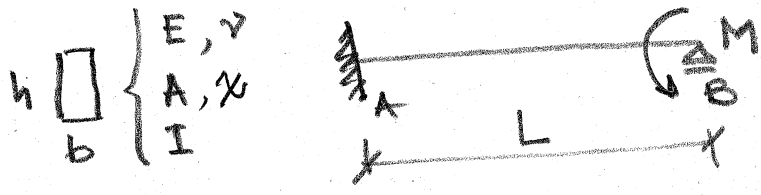
INFLUENCIA DE LA DEFORMACIÓN POR CORTE EN LA RIGIDEZ FLEXIONAL

RIGIDEZ FLEXIONAL DEBIDA A UN GIRO



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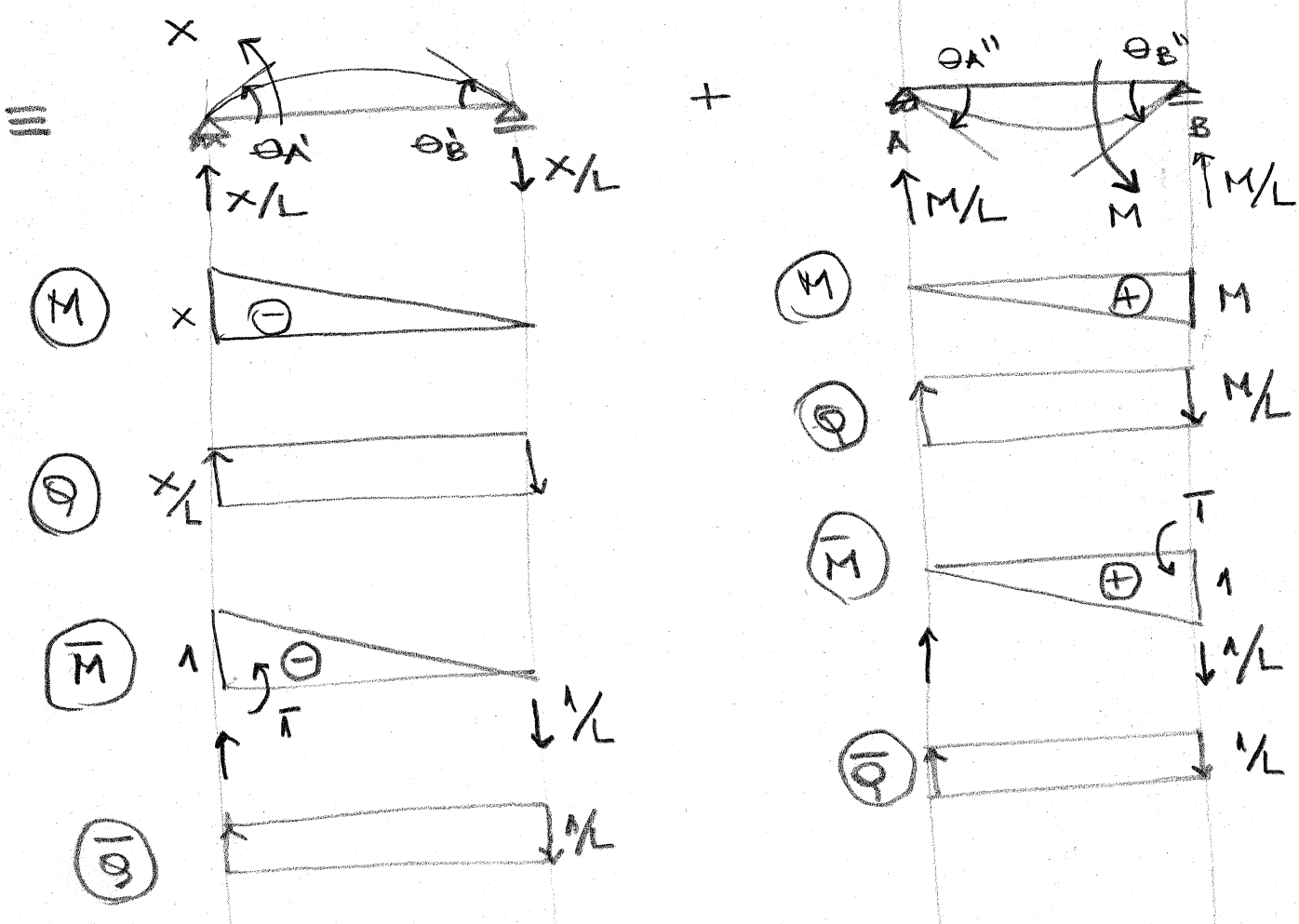


$$\theta_A = \theta_A' + \theta_A''$$

$$\theta_A' = \frac{1}{3}\frac{X \cdot 1 \cdot L}{EI} + \chi \frac{X}{L}\frac{1}{L}\frac{L}{GA} = \underbrace{\frac{XL}{3EI}}_{\text{FLEXION}} + \underbrace{\frac{\chi X}{LGA}}_{\text{CORTE}}$$

$$\theta_A'' = -\frac{1}{6}\frac{M \cdot 1 \cdot L}{EI} + \chi \frac{M}{L}\frac{1}{L}\frac{L}{GA} = -\frac{ML}{6EJ} + \frac{\chi M}{LGA}$$

$$\theta_A = 0$$

$$\frac{XL}{3EI} + \frac{\chi X}{LGA} - \frac{ML}{6EI} + \frac{\chi M}{LGA} = 0$$

$$X\left(\frac{L}{3EI} + \frac{\chi}{LGA}\right) = M\left(\frac{L}{6EI} - \frac{\chi}{LGA}\right)$$

$$X = \frac{M\,\frac{L}{6EI}\left(1 - \frac{6EI\chi}{LLGA}\right)}{\frac{L}{3EI}\left(1 + \frac{3EI}{L}\frac{\chi}{LGA}\right)}$$

$$X = \frac{M}{2}\,\frac{\left(1 - \frac{6EI\chi}{L^2GA}\right)}{\left(1 + \frac{3EI\chi}{L^2GA}\right)} \quad ; \quad \beta = \frac{6EI\chi}{L^2GA}$$

$$X = \frac{M}{2}\left(\frac{1-\beta}{1+\beta/2}\right)$$

$$\boxed{X = \frac{M}{2}\left(\frac{2-2\beta}{2+\beta}\right)}$$

$$\theta_B = \theta'_B + \theta''_B$$

$$\theta'_B = -\frac{1}{6}\frac{X\,1\,L}{EI} + \chi\frac{X}{L}\frac{1}{L}\frac{L}{GA}$$

$$\theta''_B = \frac{1}{3}\frac{M\,1\,L}{EI} + \chi\frac{M}{L}\frac{1}{L}\frac{L}{GA}$$

$$\theta_B = -\frac{XL}{6EI} + \frac{\chi X}{LGA} + \frac{ML}{3EI} + \frac{\chi M}{LGA}$$

$$\theta_B = \frac{ML}{2EI}\left(\frac{2}{3} + \frac{2\chi EI}{L^2GA}\right) + \frac{XL}{2EI}\left(\frac{2\chi EI}{L^2GA} - \frac{1}{3}\right)$$

$$\theta_B = 1$$

$$M\frac{L}{2EI}\left(\frac{2}{3} + \frac{2\chi EI}{L^2GA}\right) + X\frac{L}{2EI}\left(-\frac{1}{3} + \frac{2\chi EI}{L^2GA}\right) = 1$$

$$\beta = \frac{6EI\chi}{L^2GA}$$

$$M\frac{L}{2EI}\left(\frac{2}{3} + \frac{\beta}{3}\right) + X\frac{L}{2EI}\left(-\frac{1}{3} + \frac{\beta}{3}\right) = 1$$

$$M\frac{1}{3}\frac{L}{2EI}(2+\beta) + X\frac{1}{3}\frac{L}{2EI}(-1+\beta) = 1$$

Reemp X

$$M\frac{1}{3}\frac{L}{2EI}(2+\beta) + \frac{M}{2}\frac{1}{3}\frac{L}{2EI}\left[\frac{(2-2\beta)(-1+\beta)}{2+\beta}\right] = 1$$

$$M\frac{1}{3}\frac{L}{2EI}\left[(2+\beta) + \frac{1}{2}\left(\frac{-2+2\beta+2\beta-2\beta^2}{2+\beta}\right)\right] = 1$$

$$M\frac{1}{3}\frac{L}{2EI}\left[\frac{(2+\beta)2(2+\beta) - 2 + 2\beta + 2\beta - 2\beta^2}{2(2+\beta)}\right] = 1$$

$$M\frac{1}{3}\frac{L}{2EI}\left[\frac{4+2\beta+2\beta-1+\beta+\beta}{2+\beta}\right] = 1$$

$$M\frac{1}{3}\frac{L}{2EI}\beta\left[\frac{1+2\beta}{2+\beta}\right] = 1$$

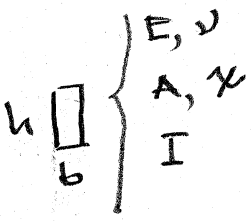
$$M^B = \frac{2EI}{L}\left[\frac{2+\beta}{1+2\beta}\right]$$

$$M^A = \frac{M^B}{2}\left(\frac{2-2\beta}{2+\beta}\right)$$

$$M^A = \frac{EI}{L}\,\frac{(2+\beta)(2-2\beta)}{(2+\beta)(1+2\beta)}$$

$$M^A = \frac{2EI}{L}\left[\frac{1-\beta}{1+2\beta}\right]$$

RIGIDEZ FLEXIONAL DEBIDA A UN DESPLAZAMIENTO



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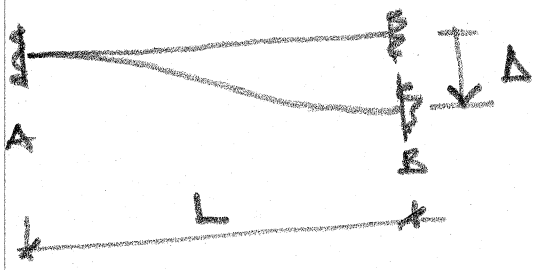

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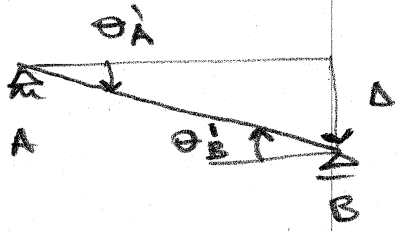

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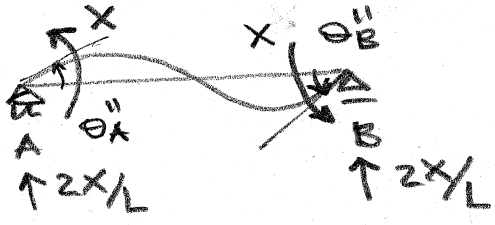
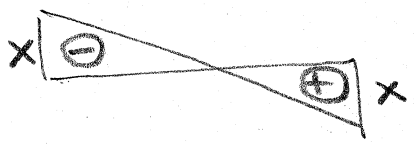


(M)



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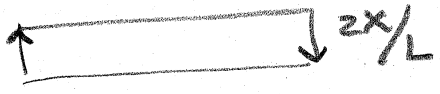

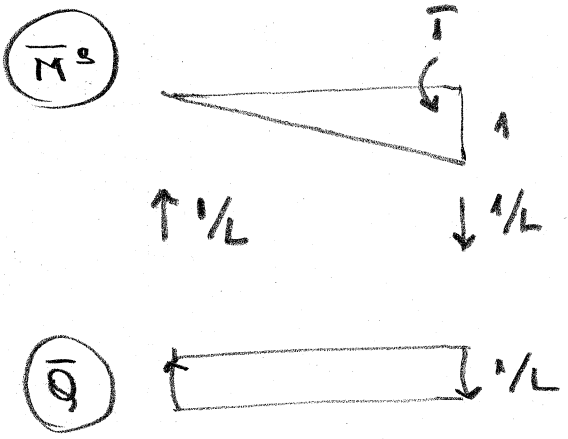

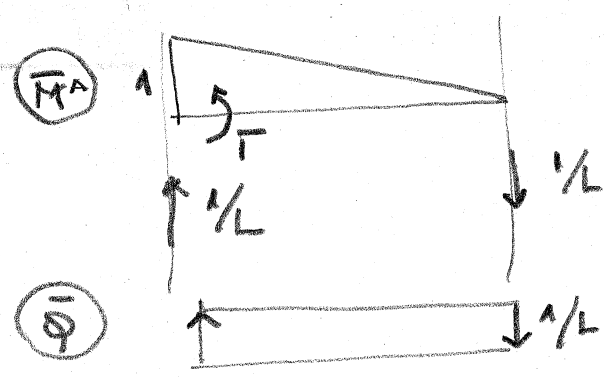

$$\theta_A' = -\frac{\Delta}{L}$$

$$\theta_A'' = \frac{1}{3} \times \frac{1}{2}\frac{L}{2}\frac{1}{EI} + \frac{1}{2} \times \frac{1}{2}\frac{L}{2}\frac{1}{EI} - \frac{1}{6} \times \frac{1}{2}\frac{L}{2}\frac{1}{EI}$$

$$\theta_A'' = \frac{1}{12}\frac{XL}{EI} + \frac{1}{8}\frac{XL}{EI} - \frac{1}{24}\frac{XL}{EI} = \frac{XL}{EI}\left(\frac{2+3-1}{24}\right)$$

$$\theta_A'' = \frac{1}{6}\frac{XL}{EI} \quad \text{(solo FLEXION)}$$

$$\theta''_A = \frac{1}{6}\frac{XL}{EI} + \frac{2X}{L}\frac{1}{L}\frac{L\chi}{GA} \quad \text{(FLEXION + CORTE)}$$

$$\theta''_A = X\left(\frac{L}{6EI} + \frac{2L\chi}{L^2GA}\right)$$

$$\theta''_A = X\frac{L}{2EI}\left(\frac{1}{3} + \frac{2X\,2EI}{L^2GA}\right)$$

$$\theta''_A = X\frac{L}{6EI}\left(1 + 2\frac{6\chi EI}{L^2GA}\right)$$

$$\theta_A'' = X\frac{L}{6EI}\left(1 + 2\beta\right)$$

$$\theta_A = \theta_A' + \theta_A''$$

$$\theta_A = -\frac{\Delta}{L} + \frac{1}{6}\frac{XL}{EI}(1+2\beta)$$

$P/\theta_A = 0$

$$\frac{1}{6}\frac{XL}{EI}(1+2\beta) = \frac{\Delta}{L}$$

$$X = \frac{6EI}{L^2}\frac{\Delta}{(1+2\beta)}$$

$P/\Delta = 1$

$$X = \frac{6EI}{L^2}\left(\frac{1}{1+2\beta}\right)$$