Deducción del Núcleo Central para una Sección RECTANGULAR

$$\sigma = \frac{P}{A} + \frac{Mc}{I} \quad \text{(Flexocompresión)}$$

$$\sigma_x = \frac{P}{A} + \frac{Pey}{I_z} \qquad M = P \cdot e$$

$$0 = \frac{P}{A} + \frac{Pey}{I_z}$$

$$-\frac{P}{A} = \frac{Pey}{I_z}$$

$$-\frac{1}{bh} = \frac{12ey}{bh^3} \qquad A = bh \qquad I = \frac{bh^3}{12}$$

$$-\frac{bh^2}{12hy} = e$$

$$e = \frac{-h^2}{12y}$$

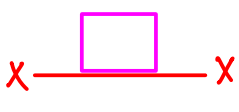
$$y = \frac{-h}{2}$$

$$e = \frac{-h^2(2)}{12(h)}$$

$$e = \frac{h}{6}$$

$$\sigma_x = \frac{-P}{A} - \frac{Pey}{I}$$

$$A = bh \qquad I_x = \frac{bh^3}{3}$$



$$\sigma_x = \frac{-P}{bh} - \frac{3eyP}{bh^3}$$

$$0 = \frac{-P}{bh} - \frac{3\,ey\,P}{bh^3}$$

$$\frac{P}{bh} = -\frac{3ey\,P}{bh^3}$$

$$\frac{bh^3}{bh} = -3ey$$

$$-\frac{bh^3}{3bh} = ey$$

$$I = \frac{bh^3}{3}$$

$$-\frac{bh^3}{3} \cdot \frac{1}{bh} = ey$$

$$-\frac{I}{A} = ey$$

$$K = \sqrt{\frac{I}{A}} \qquad \text{Radio de giro } K$$

$$K^2 = \frac{I}{A}$$

$$-K^2 = ey$$

$$y = \frac{-K^2}{e} \longleftarrow$$

Sección transversal circular

$$I = \frac{\pi r^4}{4} \qquad A = \pi r^2$$

$$K = \sqrt{\frac{I}{A}} = \sqrt{\frac{\frac{\pi r^4}{4}}{\pi r^2}} = \sqrt{\frac{\pi r^4}{4\pi r^2}} = \sqrt{\frac{r^2}{4}} = \frac{r}{2}$$

$$y = \frac{-K^2}{e} \qquad -y = \frac{K^2}{e}$$

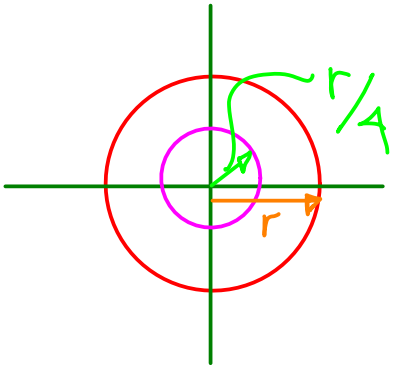
$$e \to a$$

$$-y \to R$$

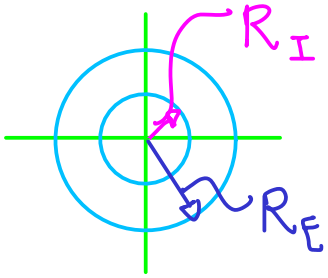
$$R = \frac{K^2}{a}$$

$$a = \frac{K^2}{R} \qquad K = \frac{r}{2}$$

$$a = \frac{R^2}{4R} = \frac{R}{4}$$



Seccion Anular



$$I = \frac{\pi}{4}\left(R_E^4 - R_I^4\right)$$

$$A = \pi\left(R_E^2 - R_I^2\right)$$

$$K = \sqrt{\frac{I}{A}} = \sqrt{\frac{\frac{\pi}{4}\left(R_E^4 - R_I^4\right)}{\pi\left(R_E^2 - R_I^2\right)}} = \sqrt{\frac{\left(R_E^2 - R_I^2\right)\left(R_E^2 + R_I^2\right)}{4\left(R_E^2 - R_I^2\right)}}$$

$$K = \sqrt{\frac{R_E^2 + R_I^2}{4}}$$

$$K^2 = \frac{R_E^2 + R_I^2}{4}$$

$$y = \frac{K^2}{e} \qquad -y = \frac{K^2}{e}$$

$$e \to a \qquad -y \to R$$

$$R = \frac{K^2}{\partial}$$

$$\partial = \frac{K^2}{R}$$

$$\partial = \frac{R_E^2 + R_I^2}{4R_E} \quad //$$

Si $R_I = 0$

$$\partial = \frac{R_E^2 + 0}{4R_E} = \frac{R_E}{4}$$

Nodeo Central de Círculo Sólido.