

## APÉNDICE 2

### Propiedades de secciones transversales

A: área de la sección

$J_z = \int_A (x^2 + y^2) dA$ : momento polar de inercia con respecto al eje z, a través del centroide de la sección

$I_x = \int_A x^2 dA$ : momento rectangular de inercia con respecto al eje x, a través del centroide

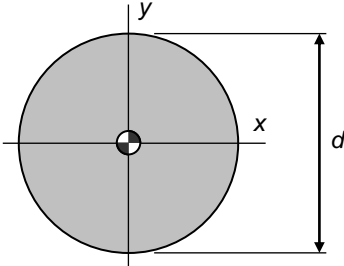
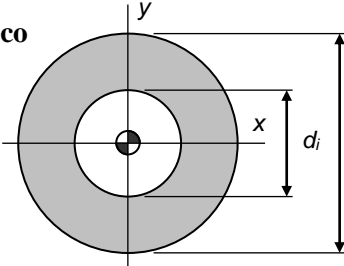
$I_y = \int_A y^2 dA$ : momento rectangular de inercia con respecto al eje y, a través del centroide

$k_x$ : radio de giro con respecto al eje x

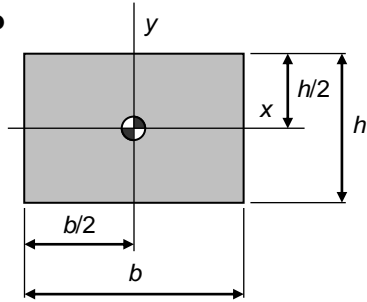
$k_y$ : radio de giro con respecto al eje y

⊙ : centroide de la sección

Eje z: eje perpendicular al plano del papel

<b>Círculo</b> 	<b>Círculo hueco</b> 
$A = \frac{\pi}{4} d^2$ $J_z = \frac{\pi}{32} d^4$ $I_x = I_y = \frac{\pi}{64} d^4$ $k_x = \sqrt{\frac{I_x}{A}} = k_y = \sqrt{\frac{I_y}{A}} = \frac{d}{4}$	$A = \frac{\pi}{4} (d_o^2 - d_i^2)$ $J_z = \frac{\pi}{32} (d_o^4 - d_i^4)$ $I_x = I_y = \frac{\pi}{64} (d_o^4 - d_i^4)$ $k_x = \sqrt{\frac{I_x}{A}} = k_y = \sqrt{\frac{I_y}{A}} = \sqrt{\frac{d_o^2 + d_i^2}{16}}$

### Rectángulo



$$A = bh$$

$$J_z = I_x + I_y$$

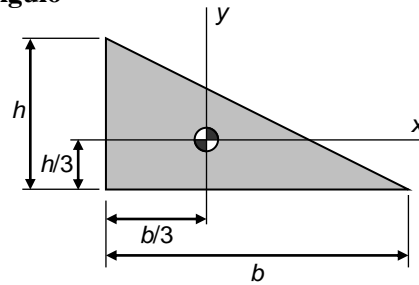
$$I_x = \frac{1}{12}bh^3$$

$$k_x = \sqrt{\frac{I_x}{A}} = \frac{\sqrt{3}}{6}h$$

$$I_y = \frac{1}{12}hb^3$$

$$k_y = \sqrt{\frac{I_y}{A}} = \frac{\sqrt{3}}{6}b$$

### Triángulo



$$A = \frac{bh}{2}$$

$$J_z = I_x + I_y$$

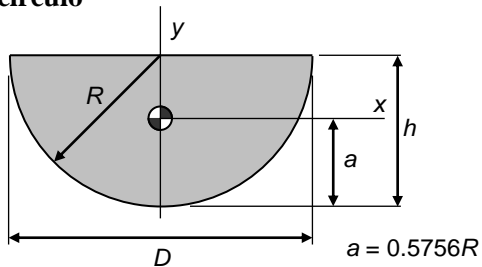
$$I_x = \frac{1}{36}bh^3$$

$$k_x = \sqrt{\frac{I_x}{A}} = \frac{\sqrt{2}}{6}h$$

$$I_y = \frac{1}{36}hb^3$$

$$k_y = \sqrt{\frac{I_y}{A}} = \frac{\sqrt{2}}{6}b$$

### Semicírculo



$$A = \frac{\pi}{8}D^2$$

$$J_z = I_x + I_y$$

$$I_x = 0.1098R^4$$

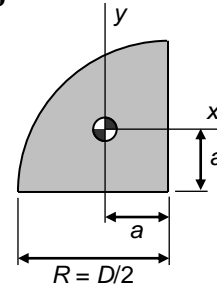
$$k_x = \sqrt{\frac{I_x}{A}} = 0.2644R$$

$$I_y = \frac{\pi}{8}R^4$$

$$k_y = \sqrt{\frac{I_y}{A}} = \frac{R}{2}$$

### Cuadrante de círculo

$$a = \frac{4R}{3\pi}$$



$$A = \frac{\pi}{16}D^2$$

$$J_z = I_x + I_y$$

$$I_x = I_y = R^4 \left( \frac{\pi}{16} - \frac{4}{9\pi} \right)$$

$$k_x = \sqrt{\frac{I_x}{A}} = k_y = \sqrt{\frac{I_y}{A}}$$