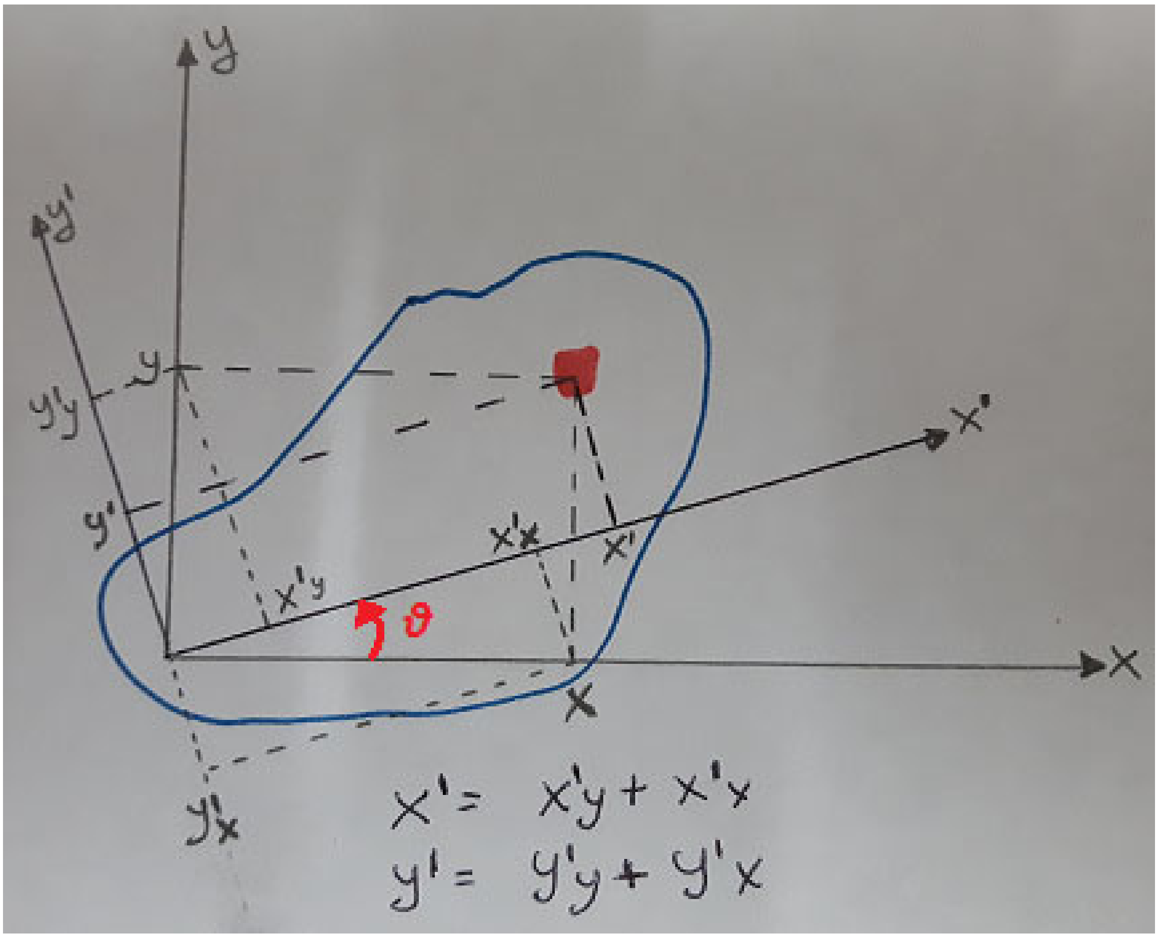

#1: [CaseMode := Sensitive, InputMode := Word]

Fórmula para rotación de ejes:

Coordenada (x,y) en el sistema x′,y′:

#2: $$\begin{bmatrix} xp = x\cdot COS(\theta) + y\cdot SIN(\theta) \\ yp = y\cdot COS(\theta) - x\cdot SIN(\theta) \end{bmatrix}$$

Inercia respecto a los ejes x e y:

#3: $$\begin{bmatrix} Ix = \int y^2\ dA \\ Iy = \int x^2\ dA \end{bmatrix}$$

Inercia respecto a los ejes del sistema x′ e y′:

#4: $$\begin{bmatrix} Ixp = \int yp^2\ dA \\ Iyp = \int xp^2\ dA \end{bmatrix}$$

Conversión:

#5: $$\begin{bmatrix} Ixp = \int (y\cdot COS(\theta) - x\cdot SIN(\theta))^2\ dA \\ Iyp = \int (x\cdot COS(\theta) + y\cdot SIN(\theta))^2\ dA \end{bmatrix}$$

#6: $$\begin{bmatrix} Ixp = \int (y^2\cdot COS(\theta)^2 - 2\cdot y\cdot COS(\theta)\cdot x\cdot SIN(\theta) + x^2\cdot SIN(\theta)^2)\ dA \\ Iyp = \int (x^2\cdot COS(\theta)^2 + 2\cdot x\cdot COS(\theta)\cdot y\cdot SIN(\theta) + y^2\cdot SIN(\theta)^2)\ dA \end{bmatrix}$$

#7: $$\left[\begin{array}{l} Ixp = COS(\theta)^2\cdot\int y^2\ dA - 2\cdot COS(\theta)\cdot SIN(\theta)\cdot\int x\cdot y\ dA + SIN(\theta)^2\cdot\int x^2\ dA \\ Iyp = COS(\theta)^2\cdot\int x^2\ dA + 2\cdot COS(\theta)\cdot SIN(\theta)\cdot\int x\cdot y\ dA + SIN(\theta)^2\cdot\int y^2\ dA \end{array}\right]$$

#8: $$\left[\begin{array}{l} Ixp = Ix\cdot COS(\theta)^2 - 2\cdot Ixy\cdot SIN(\theta)\cdot COS(\theta) + Iy\cdot SIN(\theta)^2 \\ Iyp = Iy\cdot COS(\theta)^2 + 2\cdot Ixy\cdot SIN(\theta)\cdot COS(\theta) + Ix\cdot SIN(\theta)^2 \end{array}\right]$$

Identidades trigonométricas:

#9: $$\left[\begin{array}{ll} COS(\theta)^2 = \dfrac{1 + COS(2\cdot\theta)}{2} & SIN(\theta)^2 = \dfrac{1 - COS(2\cdot\theta)}{2} \\ SIN(2\cdot\theta) = 2\cdot SIN(\theta)\cdot COS(\theta) & COS(2\cdot\theta) = COS(\theta)^2 - SIN(\theta)^2 \end{array}\right]$$

#10: $$\left[\begin{array}{l} Ixp = Ix\cdot\dfrac{1 + COS(2\cdot\theta)}{2} - Ixy\cdot SIN(2\cdot\theta) + Iy\cdot\dfrac{1 - COS(2\cdot\theta)}{2} \\ Iyp = Iy\cdot\dfrac{1 + COS(2\cdot\theta)}{2} + Ixy\cdot SIN(2\cdot\theta) + Ix\cdot\dfrac{1 - COS(2\cdot\theta)}{2} \end{array}\right]$$

Usar estas fórmulas:

#11: $$\left[\begin{array}{l} Ixp = \dfrac{Ix - Iy}{2}\cdot COS(2\cdot\theta) - Ixy\cdot SIN(2\cdot\theta) + \dfrac{Ix + Iy}{2} \\ Iyp = \dfrac{Iy - Ix}{2}\cdot COS(2\cdot\theta) + Ixy\cdot SIN(2\cdot\theta) + \dfrac{Ix + Iy}{2} \end{array}\right]$$

Buscar el ángulo θ que genere las mayores y las menores inercias Ixp e Iyp:

Se ajusta la forma de la ecuación:

#12: $$\left[\begin{array}{l} Ixp = \dfrac{Ix - Iy}{2}\cdot COS(\theta 2) - Ixy\cdot SIN(\theta 2) + \dfrac{Ix + Iy}{2} \\ Iyp = \dfrac{Iy - Ix}{2}\cdot COS(\theta 2) + Ixy\cdot SIN(\theta 2) + \dfrac{Ix + Iy}{2} \end{array}\right]$$

#13: $$\left[\begin{array}{l} \dfrac{d}{d\ \theta 2}\left(\dfrac{Ix - Iy}{2}\cdot COS(\theta 2) - Ixy\cdot SIN(\theta 2) + \dfrac{Ix + Iy}{2}\right) = 0 \\ \dfrac{d}{d\ \theta 2}\left(\dfrac{Iy - Ix}{2}\cdot COS(\theta 2) + Ixy\cdot SIN(\theta 2) + \dfrac{Ix + Iy}{2}\right) = 0 \end{array}\right]$$

#14: $$\left[\begin{array}{l} Ixy\cdot COS(\theta 2) + \dfrac{(Ix - Iy)\cdot SIN(\theta 2)}{2} = 0 \\ Ixy\cdot COS(\theta 2) + \dfrac{(Ix - Iy)\cdot SIN(\theta 2)}{2} = 0 \end{array}\right]$$

#15: $$SOLVE\left(\left[\begin{array}{l} Ixy\cdot COS(\theta 2) + \dfrac{(Ix - Iy)\cdot SIN(\theta 2)}{2} = 0 \\ Ixy\cdot COS(\theta 2) + \dfrac{(Ix - Iy)\cdot SIN(\theta 2)}{2} = 0 \end{array}\right], \theta 2\right)$$

#16: $\left[\theta 2 = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), \theta 2 = \pi - \operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), \theta 2 = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right) - \pi\right]$

#17: $\left[2\cdot\theta = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), 2\cdot\theta = \pi - \operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), 2\cdot\theta = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right) - \pi\right]$

#18: $\left[2\cdot\theta + 0 = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), 2\cdot\theta - \pi = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right), 2\cdot\theta + \pi = -\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right)\right]$

#19: $\left[\operatorname{TAN}(2\cdot\theta + 0) = \operatorname{TAN}\left(-\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right)\right), \operatorname{TAN}(2\cdot\theta - \pi) = \operatorname{TAN}\left(-\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right)\right), \operatorname{TAN}(2\cdot\theta + \pi) = \operatorname{TAN}\left(-\operatorname{ATAN}\left(\frac{2\cdot Ixy}{Ix - Iy}\right)\right)\right]$

#20: $\left[\operatorname{TAN}(2\cdot\theta) = \frac{2\cdot Ixy}{Iy - Ix}, \operatorname{TAN}(2\cdot\theta) = \frac{2\cdot Ixy}{Iy - Ix}, \operatorname{TAN}(2\cdot\theta) = \frac{2\cdot Ixy}{Iy - Ix}\right]$

Ángulo para el cual las inercias serán mayores y menores:

#21: $\operatorname{TAN}(2\cdot\theta) = \frac{2\cdot Ixy}{Iy - Ix}$