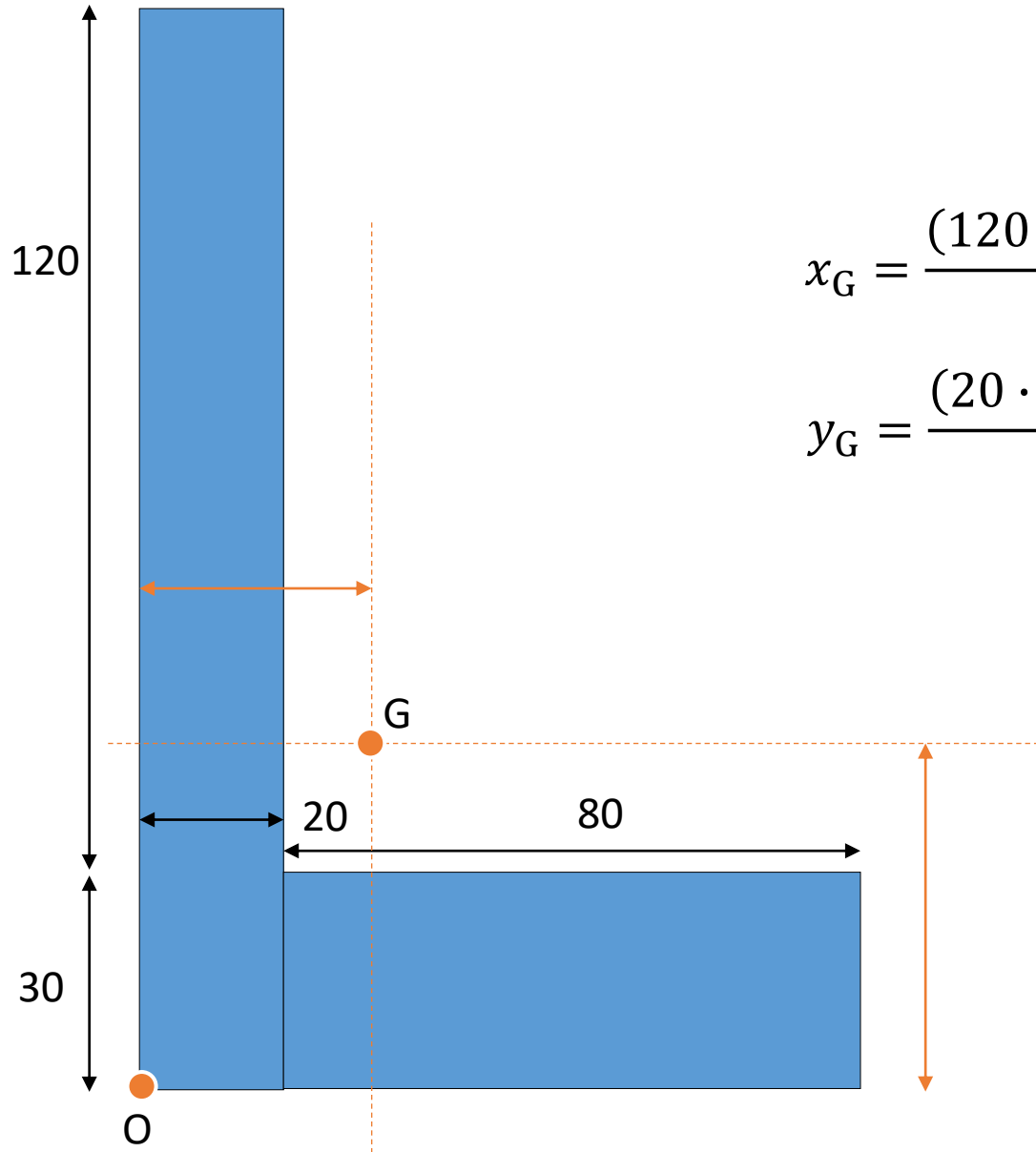


• **ESERCIZIO:**



$$x_G = \frac{S_y}{A} \quad y_G = \frac{S_x}{A}$$

$$x_G = \frac{(120 \cdot 20 \cdot 10) + (30 \cdot 100 \cdot 50)}{5400} = 32.22 \text{ cm}$$

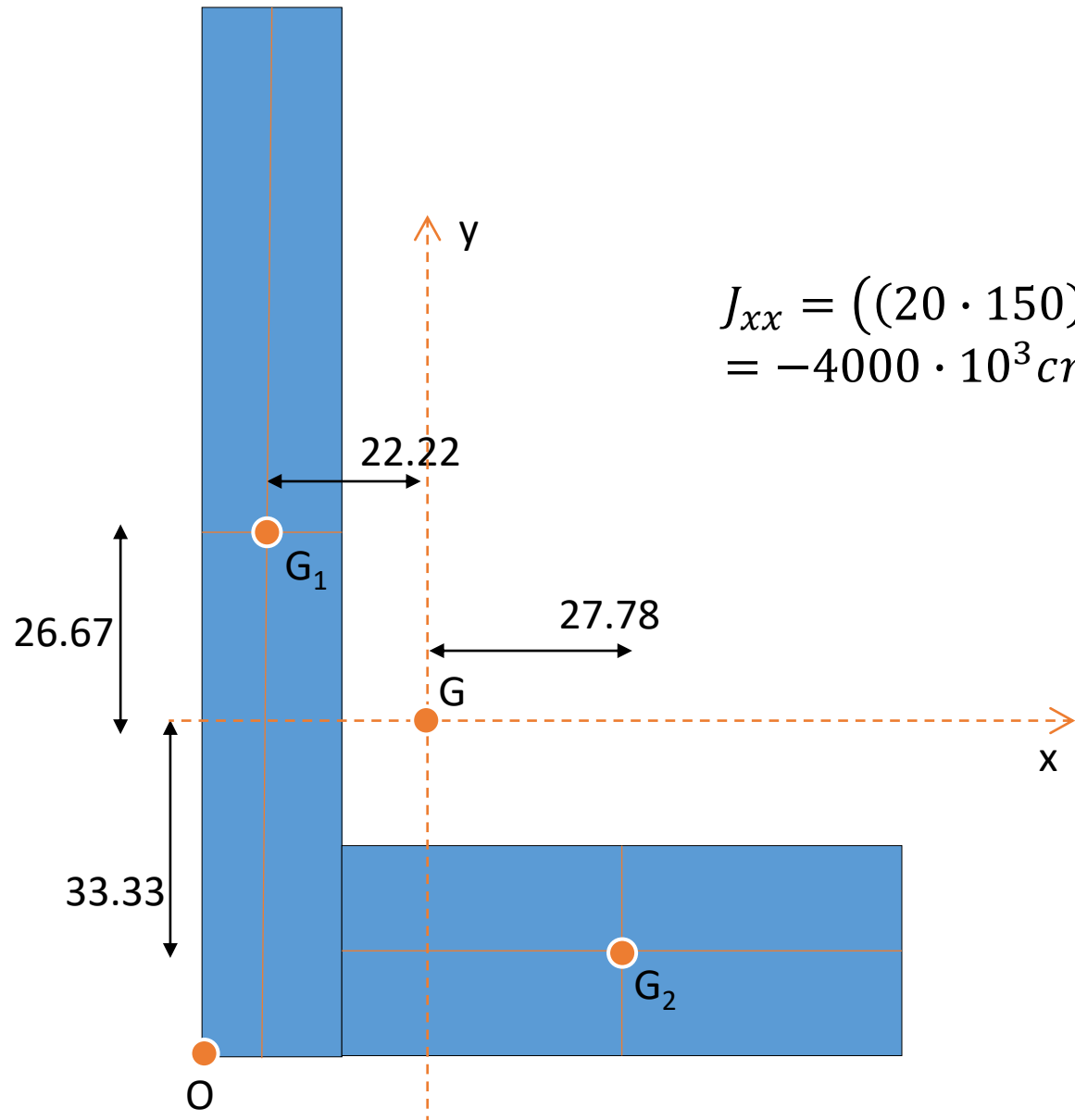
$$y_G = \frac{(20 \cdot 150 \cdot 75) + (80 \cdot 30 \cdot 15)}{5400} = 48.33 \text{ cm}$$

$$J_{x_0} = \frac{(20 \cdot 150^3)}{3} + \frac{(80 \cdot 30^3)}{3} = 23220 \cdot 10^3 \text{ cm}^4$$

$$J_{x_G} = J_{x_0} - Ay_G^2 = 10605 \cdot 10^3 \text{ cm}^4$$

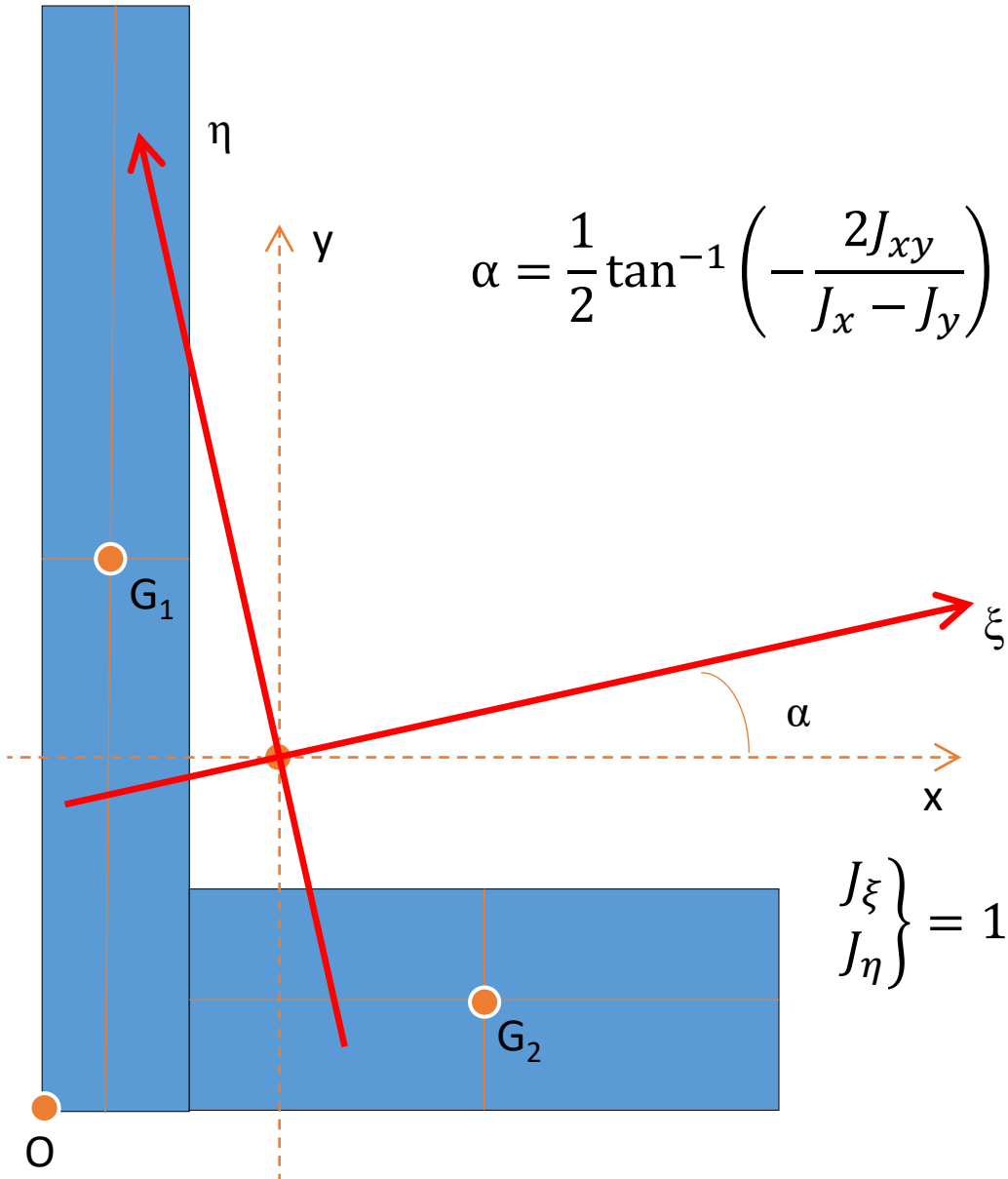
$$J_{y_0} = \frac{(120 \cdot 20^3)}{3} + \frac{(30 \cdot 100^3)}{3} = 10320 \cdot 10^3 \text{ cm}^4$$

$$J_{y_G} = J_{y_0} - Ax_G^2 = 4713 \cdot 10^3 \text{ cm}^4$$



$$J_{xx} = ((20 \cdot 150) \cdot (-22.22) \cdot 26.67) + ((80 \cdot 30) \cdot 27.78 \cdot (-33.33))$$

$$= -4000 \cdot 10^3 \text{ cm}^4$$

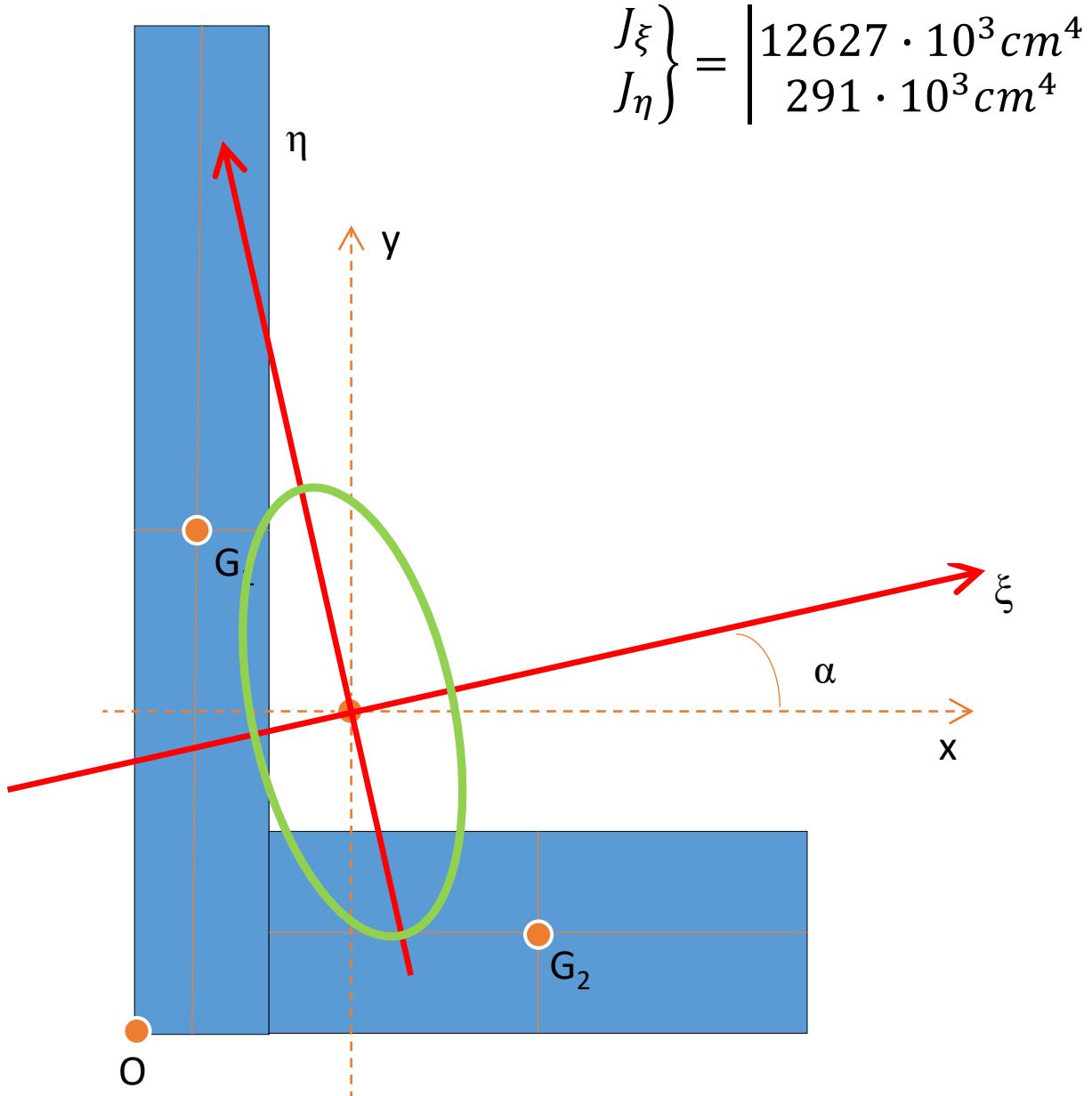


$$\alpha = \frac{1}{2} \tan^{-1} \left(-\frac{2J_{xy}}{J_x - J_y} \right) = \frac{1}{2} \tan^{-1} \left(-\frac{-2 \cdot 4000}{10605 - 4713} \right) = 0.46801 \text{ rad} = 26,815^\circ$$

$$\left. \begin{matrix} J_\xi \\ J_\eta \end{matrix} \right\} = \frac{J_x + J_y}{2} \pm \frac{1}{2} \sqrt{(J_x - J_y)^2 + 4J_{xy}^2}$$

$$\left. \begin{matrix} J_\xi \\ J_\eta \end{matrix} \right\} = 10^3 \cdot \left[\frac{10605 + 4713}{2} \pm \frac{1}{2} \sqrt{(10605 - 4713)^2 + 4 \cdot 4000^2} \right]$$

$$\left. \begin{matrix} J_\xi \\ J_\eta \end{matrix} \right\} = \begin{matrix} 12627 \cdot 10^3 \text{ cm}^4 \\ 291 \cdot 10^3 \text{ cm}^4 \end{matrix}$$



$$\left. \begin{matrix} J_{\xi} \\ J_{\eta} \end{matrix} \right\} = \begin{vmatrix} 12627 \cdot 10^3 \text{ cm}^4 \\ 291 \cdot 10^3 \text{ cm}^4 \end{vmatrix}$$

$$\rho_{\xi} = \sqrt{\frac{J_{\xi}}{A}} = 48.36 \text{ cm}$$

$$\rho_{\eta} = \sqrt{\frac{J_{\eta}}{A}} = 22.33 \text{ cm}$$