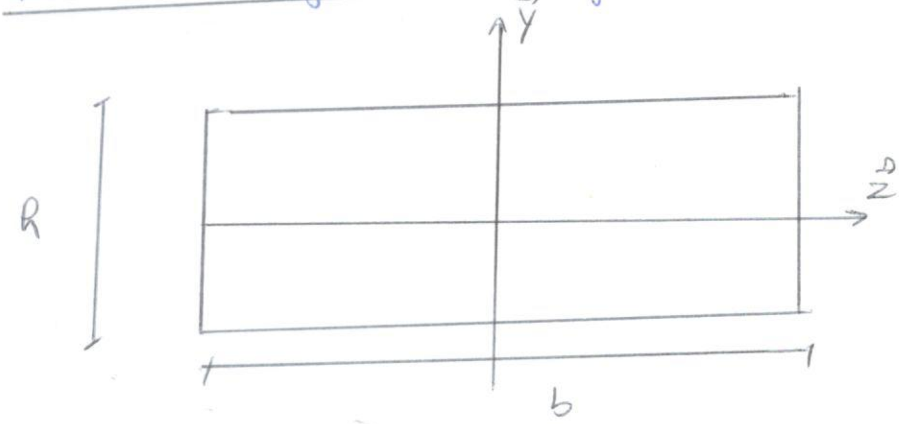
- Calcul du moment quadratique $I(G,\vec{z})$:

→ <u>Pour une surface rectangulaire:</u>



$$I(G,\vec{z}) = \int_S y^2 . ds$$

$$= \int_{b/2}^{b/2} \int_{-h/2}^{h/2} y^2 \, dz . dy$$

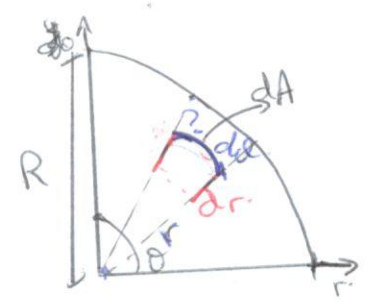
$$= \left[\frac{y^3}{3}\right]_{-h/2}^{h/2} \left(z\right)_{-b/2}^{b/2}$$

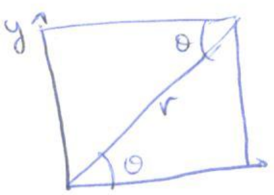
$$= \left(\frac{h^3}{24} + \frac{h^3}{24}\right) \times \left(\frac{b}{2} + \frac{b}{2}\right)$$

$$= \frac{h^3}{12} \times b$$

D'où $\boxed{I(G,\vec{z}) = \frac{bh^3}{12}}$

→ <u>Pour une surface circulaire:</u>





$\sin\theta = \frac{y}{r}$

$y = r.\sin\theta$

$$I_0 = \int_A r^2 . dA$$

$$= \int_A r^2 . \sin^2\theta (r.dr.d\theta)$$

$$I_0 = \int_0^R r^3 \int_0^{2\pi} \sin^2\theta \, d\theta . dr.$$

$$= \int_0^R r^3 \int_0^{2\pi} \frac{1-\cos 2\theta}{2} \, d\theta . dr.$$

$$= \int_0^R \frac{r^3}{2} \left[\theta - \frac{1}{2}\sin 2\theta\right]_0^{2\pi} dr.$$

$$= \left[\frac{r^4}{8}\right]_0^R (2\pi).$$

$$\boxed{I_0 = \frac{\pi d^4}{64}}$$