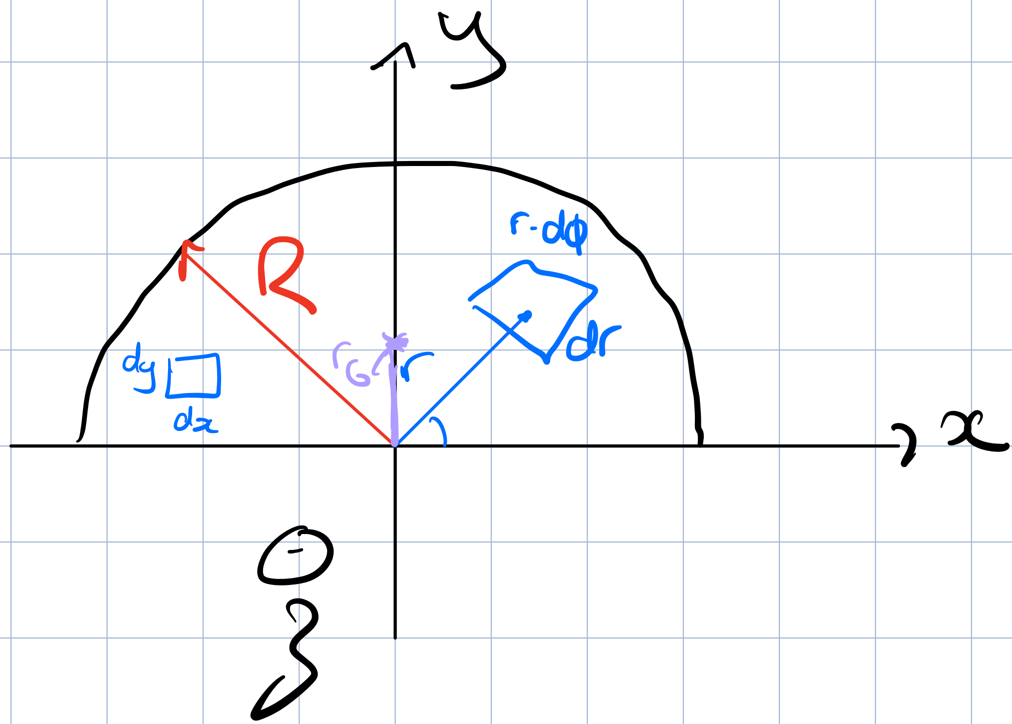
demi disque épaisseur d



$$\vec{r}_G = \frac{1}{M} \sum_{\alpha} \vec{r}_\alpha m_\alpha$$

$$M = d \cdot \frac{\pi R^2}{2} \cdot \rho$$

$$\Rightarrow \vec{r}_G = \frac{1}{M} \int \vec{r} \rho \boxed{dx\,dy\,dz}$$

$$= \frac{1}{M} \int_0^d \int_0^\pi \int_0^R \vec{r} \rho \boxed{r\,d\phi\,dr\,dz}$$

$$\vec{r} = r\cos\phi\,\hat{x} + r\sin\phi\,\hat{y}$$

$$\Rightarrow (\vec{r}_G)_x = \underbrace{\frac{\rho}{M}}_{=\frac{2}{\pi R^2 d}} \underbrace{\left[\int_0^d dz\right]}_{=d} \underbrace{\left[\int_0^\pi \cos\phi\, d\phi\right]}_{=0} \underbrace{\left[\int_0^R r^2\, dr\right]}_{=\frac{1}{3}r^3}$$

$$= 0$$

$$\Rightarrow (\vec{r}_G)_y = \frac{\rho}{M}\cdot d \cdot \underbrace{\left[\int_0^\pi \sin\phi\, d\phi\right]}_{\text{primitive est } -\cos\phi \text{ pris entre } 0 \text{ et } \pi \;=\; 1+1 \;=\; 2} \underbrace{\left[\int_0^R r^2\, dr\right]}_{=\frac{r^3}{3}}$$

$$= \frac{\rho}{M}\cdot d\cdot 2\cdot \frac{R^3}{3} = \frac{4}{\pi R^2}\cdot \frac{R^3}{3}$$

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

$\simeq$ 40% du Rayon