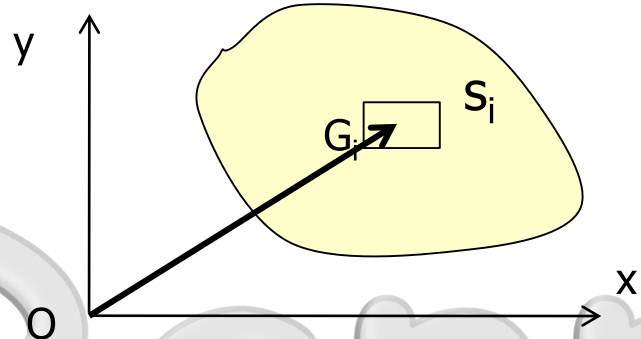
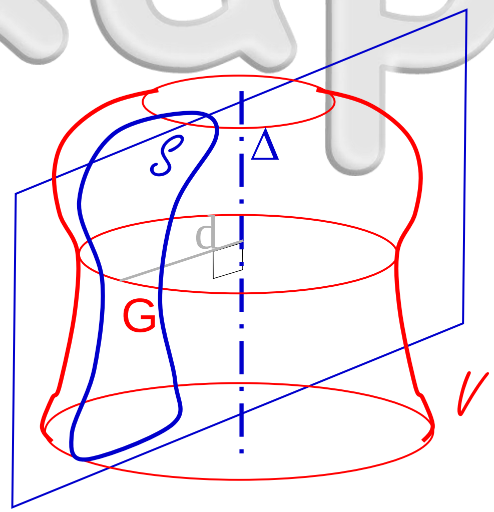
Barycentre:



$$S \cdot \overrightarrow{OG} = \sum s_i \cdot \overrightarrow{OG_i}$$

Théorème de Guldin:



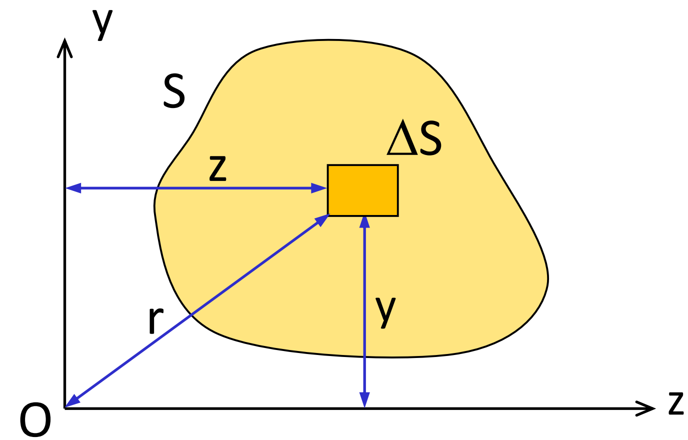
$$\mathcal{V} = 2\pi d.\mathcal{S}$$

S72-9 - Moment quadratique

Moments quadratiques d'une surface autour d'un axe :

$$\Delta I_z = y^2 \,.\, \Delta S \Longrightarrow Iz = \sum_{(S)} y^2 \cdot \Delta S = \int y^2 \cdot dS$$

$$\Delta I_y = z^2 \,.\, \Delta S \Longrightarrow Iy = \sum_{(S)} z^2 \cdot \Delta S = \int z^2 \cdot dS$$



Moments quadratiques d'une surface par rapport à un point :

$$\Delta I_O = r^2 \,.\, \Delta S \Longrightarrow Io = \sum_{(S)} r^2 \cdot \Delta S = \int r^2 \cdot dS$$

$$\Longrightarrow \quad I_O = I_y + I_z$$

S72-9 - Moment quadratique

Moment quadratique de surface composée :

$$I_y(S) = I_y(S_1) + I_y(S_2) + \ldots + I_y(S_n)$$

$$I_z(S) = I_z(S_1) + I_z(S_2) + \ldots + I_z(S_n)$$

$$I_O(S) = I_O(S_1) + I_O(S_2) + \ldots + I_O(S_n)$$

Changement de référence :

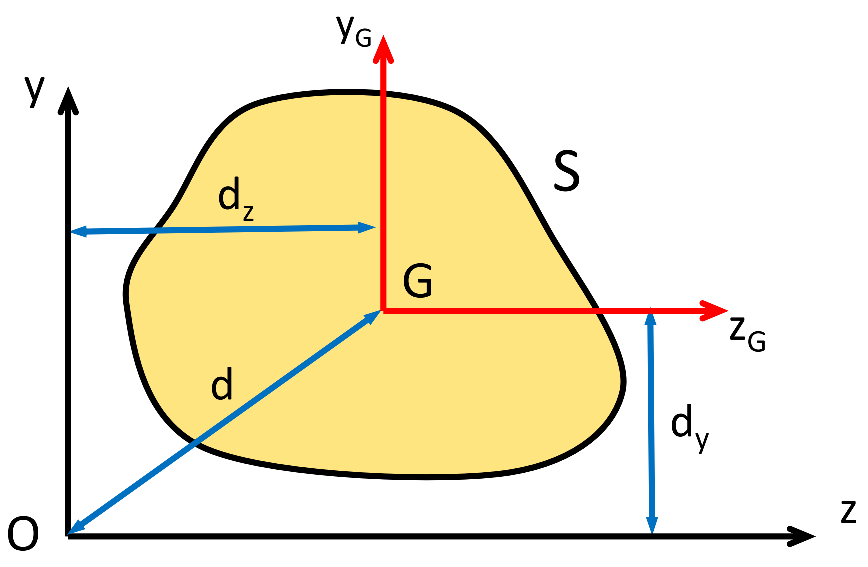
$$I_{Oy} = I_{Gy} + S.d_z^2$$

$$I_{Oz} = I_{Gz} + S.d_y^2$$

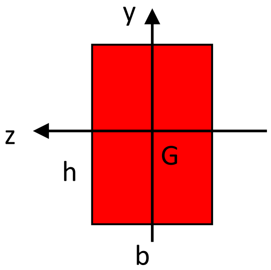
$$I_O = I_{Oy} + I_{Oz}$$

$$I_O = I_{Gy} + S.d_z^2 + I_{Gz} + S.d_y^2$$
$$= (I_{Gy} + I_{Gz}) + (S.d_z^2 + S.d_y^2)$$

$$I_O = I_G + S.d^2$$



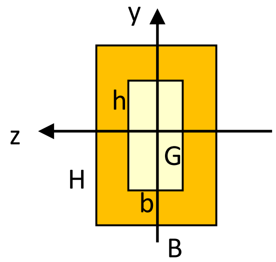
Moment quadratique de surfaces particulières :



$$I_{Gy} = \frac{hb^3}{12}$$

$$I_{Gz} = \frac{bh^3}{12}$$

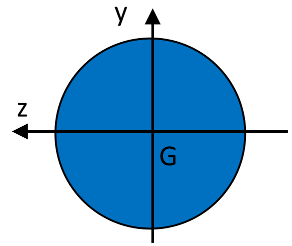
$$I_G = \frac{bh\,(h^2 + b^2)}{12}$$



$$I_{Gy} = \frac{HB^3}{12} - \frac{hb^3}{12}$$

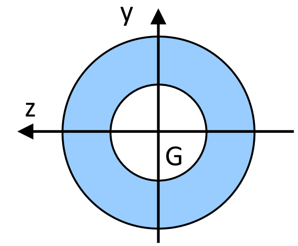
$$I_{Gz} = \frac{BH^3}{12} - \frac{bh^3}{12}$$

$$I_G = \frac{BH\,(H^2 + B^2)}{12} - \frac{bh\,(h^2 + b^2)}{12}$$



$$I_{Gy} = I_{Gz} = \frac{\pi D^4}{64}$$

$$I_G = \frac{\pi D^4}{32}$$



$$I_{Gy} = I_{Gz} = \frac{\pi(D^4 - d^4)}{64}$$

$$I_G = \frac{\pi(D^4 - d^4)}{32}$$