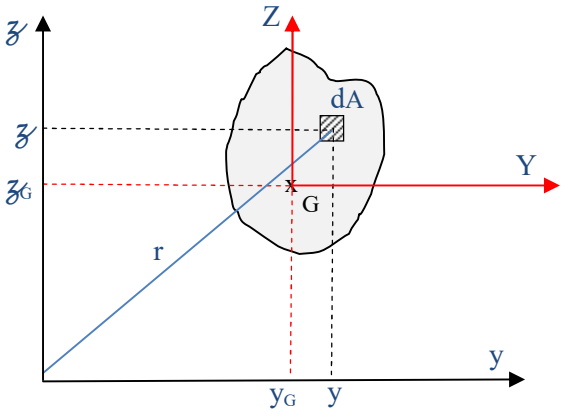
Chapitre IV

Caractéristiques géométriques des sections

I-1 Moment statique

$$S_y = \iint_A z\, dA \qquad [m^3]$$
$$S_z = \iint_A y\, dA$$

$$S_{YG} = 0 \quad \text{et} \quad S_{YG} = 0$$



I-2 Posisition du centre de gravité

$$y_G = \frac{1}{A}\iint_A y\, dA = \frac{S_z}{A} \qquad [m]$$
$$z_G = \frac{1}{A}\iint_A z\, dA = \frac{S_y}{A}$$

donc :
$$S_y = A \cdot z_G$$
$$S_z = A \cdot y_G$$

Dans le cas de sections composées :
$$S_y = \sum A_i \cdot z_{Gi}$$
$$S_z = \sum A_i \cdot y_{Gi}$$

I-3 Moment d'inertie quadratique

$$I_y = \iint_A z^2\, dA \qquad [m^4]$$
$$I_z = \iint_A y^2\, dA$$

I-4 Moment d'inertie polaire

$$I_p = \iint_A r^2\, dA = \iint_A (y^2 + z^2)\, dA = I_z + I_y \qquad [m^4]$$

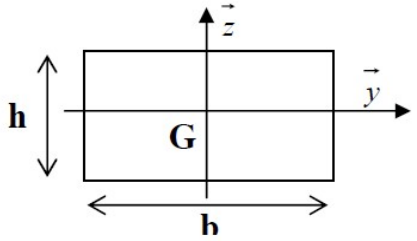
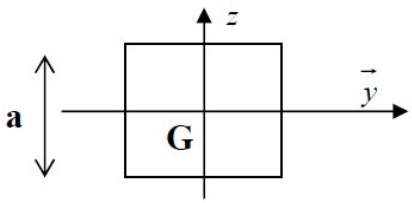
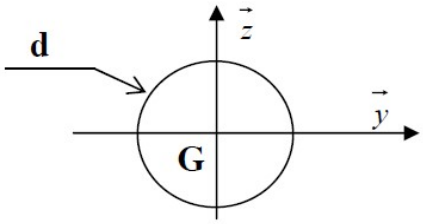
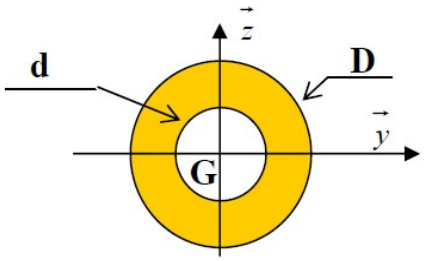
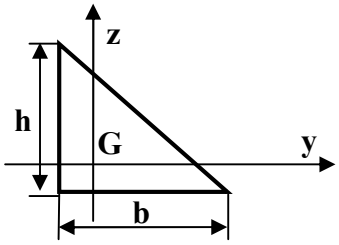
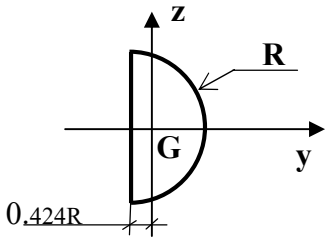
I-5 Produit d'inertie

$$I_{yz} = \iint_A y z\, dA \qquad [m^4]$$

I-6 Moment d'inertie par rapport aux axex parallèles (thèorème de huygens)

$$z = z_G + Z$$
$$y = y_G + Y$$
$$\Longrightarrow$$
$$I_y = I_{YG} + z_G^2 \cdot A$$
$$I_z = I_{ZG} + y_G^2 \cdot A$$
$$I_{yz} = I_{YZG} + y_G z_G \cdot A$$

Moment d'inertie quadratique de sections usuelles

	I_{Gyy}	I_{Gzz}	$I_G = I_{Gyy} + I_{Gzz}$
	$\frac{b.h^3}{12}$	$\frac{h.b^3}{12}$	$\frac{hb}{12}(b^2+h^2)$
	$\frac{a^4}{12}$	$\frac{a^4}{12}$	$\frac{a^4}{6}$
	$\frac{\pi.d^4}{64}$	$\frac{\pi.d^4}{64}$	$\frac{\pi.d^4}{32}$
	$\frac{\pi}{64}(D^4-d^4)$	$\frac{\pi}{64}(D^4-d^4)$	$\frac{\pi}{32}(D^4-d^4)$
	$\frac{bh^3}{36}$	$\frac{hb^3}{36}$	$\frac{bh(h^2+b^2)}{36}$
	$0.39\ R^4$	$0.11\ R^4$	$0.50\ R^4$