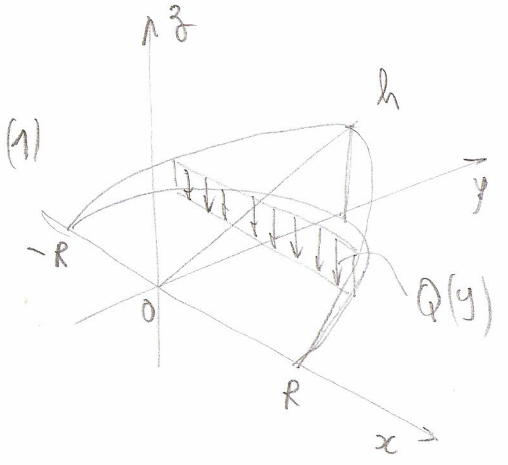
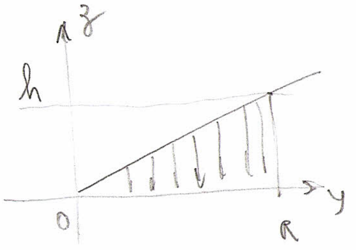
Carga distribuida numa superficie circular

Carga triangular

(1)

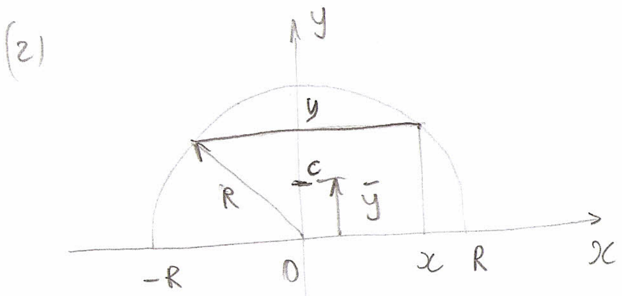




$$z = \frac{h}{R} y$$

Ponto de aplicação da força resultante $\bar{y}$

(2)



$$R^2 = x^2 + y^2 \Rightarrow x = \sqrt{R^2 - y^2}$$

$$(1) \text{ e } (2) \longrightarrow Q(y) = 2x \times z = \frac{h}{R} y \times 2\sqrt{R^2 - y^2}$$

Calculo de $\bar{y}$

$$P_y = \int_0^R y\, Q(y)\, dy = 2\frac{h}{R}\int_0^R y^2 \sqrt{R^2-y^2}\, dy = \frac{\pi h R^3}{8}$$

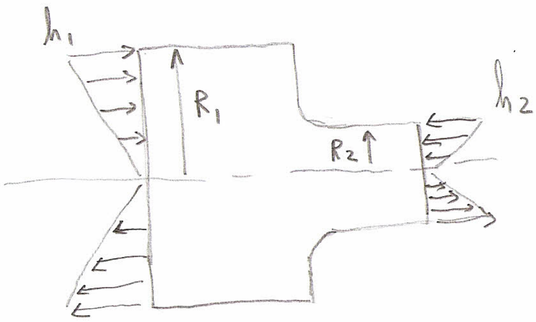
$$\bar{y} = \frac{P_y}{P}$$

$$P = \int_0^R Q(y)\, dy = 2\frac{h}{R}\int_0^R y\sqrt{R^2-y^2}\, dy = \frac{2hR^2}{3}$$

Força resultante

$$\Rightarrow \bar{y} = \frac{\pi h R^3}{8} \times \frac{3}{2hR^2} = \frac{3\pi R}{16}$$

Momento fletor num veio



Calculo de h_1 ou h_2

Equilibrio de momentos $\Rightarrow P_1 \times \bar{y}_1 = P_2 \times \bar{y}_2$

$$\Rightarrow \frac{2h_1R_1^2}{3} \times \frac{3\pi R_1}{16} = \frac{2h_2R_2^2}{3} \times \frac{3\pi R_2}{16}$$

$$\Rightarrow \boxed{h_1 R_1^3 = h_2 R_2^3}$$

FERNANDOBATISTA.NET