

Vzorce pro SMR 1

Těžiště plochy: $y_c = \frac{\sum S_{z_i}}{A}$ $z_c = \frac{\sum S_{y_i}}{A}$

Momenty setrvačnosti plošných obrazců, elipsa setrvačnosti:

$$I_y = \int_A z^2 dA \quad I_0 = \iint_A (y^2 + z^2) dydz \quad I_0 = I_{0c} + A(y_0^2 + z_0^2) \quad \text{tg } 2\alpha_0 = \frac{2D_{yz}}{I_z - I_y}$$

$$I_z = \int_A y^2 dA \quad T = \begin{bmatrix} \cos \alpha & \sin \alpha \\ -\sin \alpha & \cos \alpha \end{bmatrix} \quad T^{-1} = T^T \quad I_{\bar{y}} = I_{yc} + A z_0^2$$

$$D_{yz} = \int_A yz dA \quad I_{\bar{z}} = I_{zc} + A y_0^2 \quad I_{1,2} = \frac{I_y + I_z}{2} \pm \frac{1}{2} \sqrt{(I_y - I_z)^2 + 4D_{yz}^2} \quad I_1 \geq I_2$$

$$D_{\bar{y}\bar{z}} = D_{yzc} + A \cdot y_0 \cdot z_0 \quad i_1 = \sqrt{\frac{I_1}{A}} \quad i_2 = \sqrt{\frac{I_2}{A}}$$

Momenty setrvačnosti základních obrazců:

	$A = b \cdot h$ $y_c = \frac{b}{2}; z_c = \frac{h}{2}$ $I_{y_c} = \frac{bh^3}{12}; I_{z_c} = \frac{hb^3}{12}$ $I_y = \frac{bh^3}{3}; I_z = \frac{hb^3}{3}$ $D_{yz} = \frac{b^2h^2}{4}; D_{y_cz_c} = 0$		$A = \frac{b \cdot h}{2}$ $y_c = \frac{b}{3}; z_c = \frac{h}{3}$ $I_{y_c} = \frac{bh^3}{36}; I_{z_c} = \frac{hb^3}{36}$ $I_y = \frac{bh^3}{12}; I_z = \frac{hb^3}{12}$ $I_{y'} = \frac{bh^3}{4}$ $D_{y_cz_c} = -\frac{b^2h^2}{72}; D_{yz} = \frac{b^2h^2}{24}; D_{y'z'} = -\frac{b^2h^2}{8}$
	$A = \pi \cdot r^2 = \pi \frac{d^2}{4}$ $I_{y_c} = I_{z_c} = \frac{\pi r^4}{4} = \frac{\pi d^4}{64}$ $D_{y_cz_c} = 0$		$A = \frac{\pi \cdot r^2}{2} = \frac{\pi \cdot d^2}{8}$ $z_c = \frac{4r}{3\pi} = \frac{3d}{2\pi}$ $I_{y_c} = \left(\frac{\pi}{8} - \frac{8}{9\pi}\right)r^4 = 0,1098r^4$
	$A = \frac{b \cdot h}{2} \quad z_c = \frac{h}{3}$ $I_{y_c} = \frac{bh^3}{36}; I_{z_c} = \frac{hb^3}{48}$ $I_y = \frac{bh^3}{12}; D_{y_cz_c} = 0$		$I_y = I_z = \frac{\pi \cdot r^4}{8} = \frac{\pi \cdot d^4}{128} \quad D_{y_cz_c} = 0$ $A = \frac{\pi \cdot r^2}{4} = \frac{\pi \cdot d^2}{16} \quad z_c = y_c = \frac{4r}{3\pi} = \frac{3d}{2\pi}$ $I_{y_c} = \left(\frac{\pi}{16} - \frac{4}{9\pi}\right)r^4 = 0,0549r^4$
	$A = \pi \cdot a \cdot b$ $I_{y_c} = \frac{\pi}{4} ab^3; I_{z_c} = \frac{\pi}{4} ba^3$ $D_{y_cz_c} = 0$	$I_y = I_z = \frac{\pi \cdot r^4}{16} = \frac{\pi \cdot d^4}{256}$ $D_{y_cz_c} = \left(\frac{1}{8} - \frac{4}{9\pi}\right)r^4 = -0,0165r^4$ $D_{yz} = \frac{r^4}{8}$	