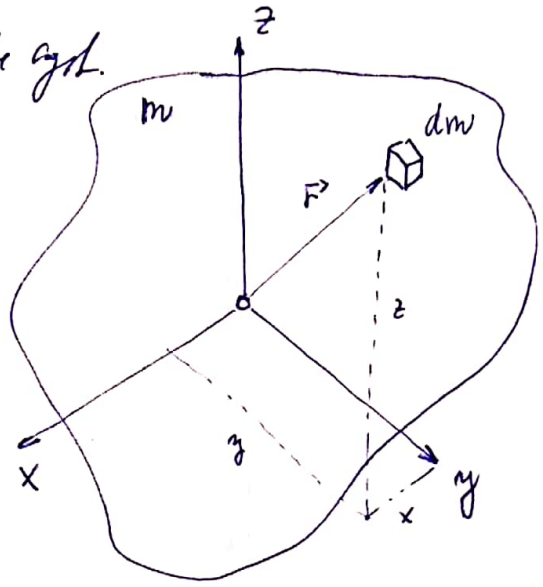
PRODUCTS OF INERTIA

with respect to axes of coordinate syst.



$x, y: \quad D_{xy} = \int_{(m)} x \cdot y \, dm$

$y, z: \quad D_{yz} = \int_{(m)} y \cdot z \, dm$

$z, x: \quad D_{zx} = \int_{(m)} z \cdot x \, dm$

MOMENTS OF INERTIA

beside J_x, J_y, J_z we have other characteristics of mass properties of body: D_{xy}, D_{xz}, D_{yz}

PRODUCTS OF INERTIA

MATRIX OF INERTIA

$$\mathbb{I} = \begin{bmatrix} J_x & -D_{xy} & -D_{xz} \\ & J_y & -D_{yz} \\ \text{Sym.} & & J_z \end{bmatrix} = \begin{bmatrix} & x & y & z \\ x & J_x & -D_{xy} & -D_{xz} \\ y & -D_{yx} & J_y & -D_{yz} \\ z & -D_{zx} & -D_{zy} & J_z \end{bmatrix}$$

$D_{xy} = D_{yx}$; $D_{xz} = D_{zx}$; $D_{yz} = D_{zy}$

example: $D_{xz} = 100$

$$\begin{bmatrix} & & -100 \\ & & \\ & & \end{bmatrix}$$

TOTAL CHARACTERISATION OF MASS PROPERTIES OF RIGID BODY

m ... mass

J_x, J_y, J_z ... moments of inertia

D_{xy}, D_{xz}, D_{yz} ... products of inertia

$C[x_c, y_c, z_c]$ ... coordinates of center of mass