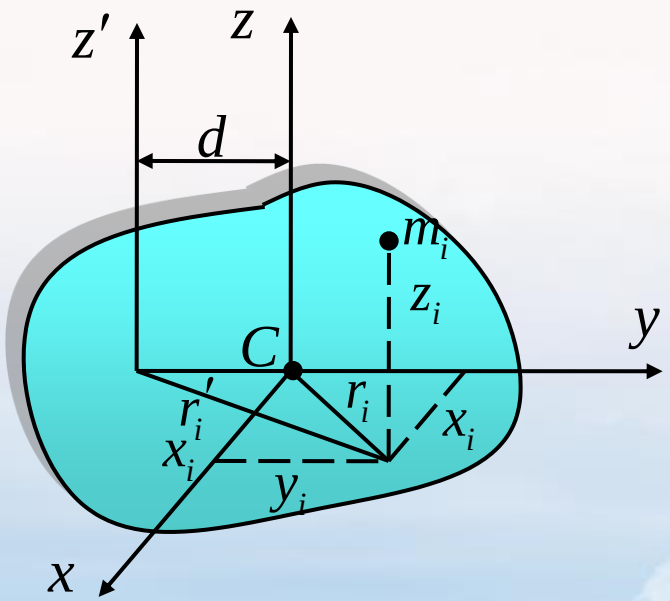
转动惯量的平行移轴定理

航海力学

动量矩定理和定轴转动微分方程

转动惯性的平行移轴定理



$$J_z = \sum_{i=1}^{n} m_i r_i^2$$

$$= \sum_{i=1}^{n} m_i \left(x_i^2 + y_i^2 \right)$$

$$J_z' = \sum_{i=1}^{n} m_i r_i'^2 = \sum_{i=1}^{n} m_i \left[x_i^2 + \left(y_i + d \right)^2 \right]$$

$$= \underbrace{\sum_{i=1}^{n} m_i \left(x_i^2 + y_i^2 \right)}_{J_z} + 2d \underbrace{\sum_{i=1}^{n} m_i y_i}_{My_c} + d^2 \underbrace{\sum_{i=1}^{n} m_i}_{M}$$

$My_c = 0$

$$J_z' = J_z + d^2 M$$

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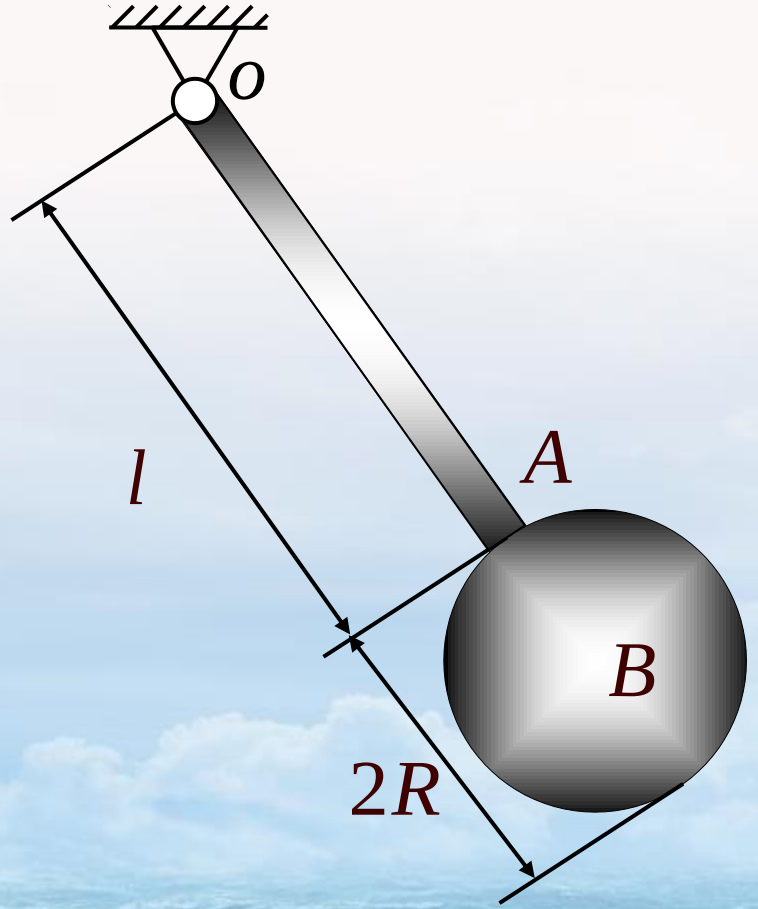
如图所示，摆由均质杆OA与盘B组成。OA=l，杆质量为m_1，圆盘质量为m_2，圆盘半径为R。试求摆对O轴的转动惯量。



解：

$$J_{o杆}=\frac{1}{3}m_1l^2$$

$$J_{o盘}=J_B+m_2\cdot OB^2$$

$$=\frac{m_2R^2}{2}+m_2\cdot(l+R)^2$$

$$J_o=J_{o杆}+J_{o盘}$$

$$=\frac{1}{3}m_1l^2+\frac{m_2R^2}{2}+m_2\cdot(l+R)^2$$