

1.1

O주차 - X, X

관성계 : 절대 좌표계 (x, y, z)

비관성계 : 회전좌표계 (x', y', z') 극좌표 (r, θ, z)

$(x, y, z) \rightarrow (r, \theta, z)$

수평 방향은 정역학 평형 상태에 있으므로, $(x, y) \rightarrow (r, \theta)$

$$\vec{F} = F_x \hat{i} + F_y \hat{j}$$

$$F_x = m \frac{d^2 x}{dt^2}, F_y = m \frac{d^2 y}{dt^2}$$

$$(x, y) = (r \cos \theta, r \sin \theta)$$

$$F_r = F_x \cos \theta + F_y \sin \theta = m \left(\frac{d^2 x}{dt^2} \cos \theta + \frac{d^2 y}{dt^2} \sin \theta \right)$$

$$F_\theta = F_y \cos \theta - F_x \sin \theta = m \left(\frac{d^2 y}{dt^2} \cos \theta - \frac{d^2 x}{dt^2} \sin \theta \right)$$

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$$\begin{aligned}x &= r \cos \theta, \quad \frac{dx}{dt} = \cos \theta \frac{dr}{dt} - r \sin \theta \frac{d\theta}{dt}, \\ \frac{d^2x}{dt^2} &= \cos \theta \frac{d^2r}{dt^2} - \sin \theta \frac{dr}{dt} - \sin \theta \frac{dr}{dt} \frac{d\theta}{dt} - r \cos \theta \frac{d^2\theta}{dt^2} \\ y &= r \sin \theta, \quad \frac{dy}{dt} = \sin \theta \frac{dr}{dt} + r \cos \theta \frac{d\theta}{dt}, \\ \frac{d^2y}{dt^2} &= \sin \theta \frac{d^2r}{dt^2} + \cos \theta \frac{dr}{dt} + \cos \theta \frac{dr}{dt} \frac{d\theta}{dt} - r \sin \theta \frac{d^2\theta}{dt^2}\end{aligned}$$

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Lorem Ipsum Dolor Sit Amet