Föreläsning 15 19/02-15

Kinetik för partiklar $\quad I = \int r^2 dm$

$\Sigma \bar{F} = m\bar{a}_G$ (*) $\qquad \Sigma \bar{F} = m\bar{a}_G \qquad$ G: masscentrum

Frilägganing $\qquad (\Sigma \bar{M}_G = \underline{I}_G \bar{\alpha}) \qquad \underline{I}_G$: Tröghetstensorn

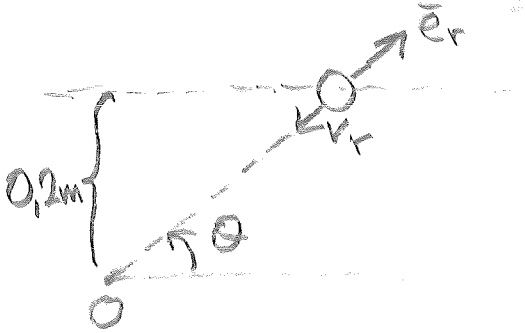
statik $\qquad\qquad\qquad\qquad$ (Beskriver massfördelning)

Tröghetskrafter: "Fiktiva" krafter $\bar{\alpha}$: Vinkelacceleration

Varning - teckenfel

(*) Inertialsystem har ingen acceleration

- Cylinderkoordinater



$$\bar{v} = \underbrace{\dot{r}\bar{e}_r}_{v_r} + \underbrace{r\dot{\theta}\bar{e}_\theta}_{v_\theta} \quad (1)$$

Geometri: $|v_r| = v\cos\theta = v\cos 60^\circ$ (2)

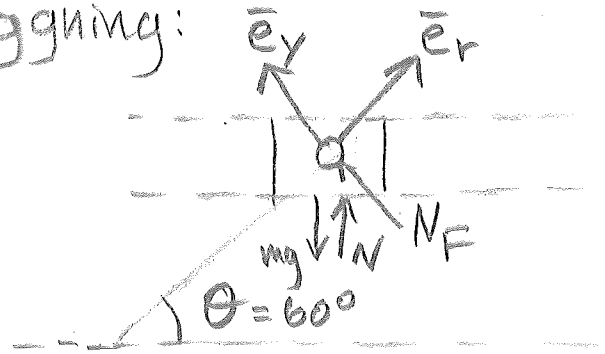
$|v_\theta| = v\sin\theta = v\sin 60^\circ$ (3)

$$\frac{0{,}2}{r} = \sin 60^\circ \quad (4)$$

Acceleration: $\bar{a} = \underbrace{(\ddot{r} - r\dot{\theta}^2)}_{a_r}\bar{e}_r + \underbrace{(r\ddot{\theta} - 2r\dot{\theta})}_{a_\theta}\bar{e}_\theta + \underbrace{\ddot{z}}_{a_z}\bar{e}_z \quad (5)$

Insättning ger: $(\ddot{r} - \frac{1{,}6}{\sqrt{3}})\bar{e}_r - \frac{3{,}2}{3}\bar{e}_\theta$

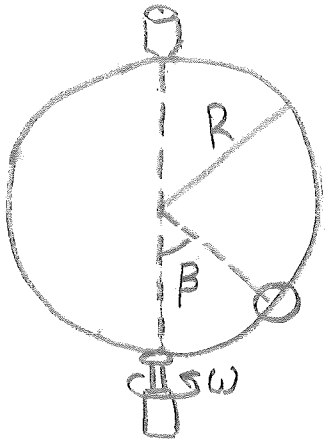
Frilägging:



$\Sigma F_r = ma_r$

$\Sigma F_\theta = ma_\theta$

Uppgift 7.22



Går bra att använda båda koordinatsys

Naturliga koordinater $\bar{e}_t, \bar{e}_n, \bar{e}_b$

$\bar{e}_t \times \bar{e}_n$

$\bar{e}_r, \bar{e}_\theta, \bar{e}_z$