Rigid Rotation

Monday, 11 October 2021 10.34

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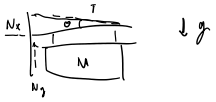


$\Sigma F = 0 \quad \Sigma \tau = 0$

↓

$\Sigma F_x = 0 \quad \Sigma F_y = 0$

- $\Sigma \tau_A = 0$

$mg \frac{L}{2}$

$mg\frac{L}{2} + mg\frac{L}{2} - T\sin\theta = 0 \rightarrow T = \frac{(M+m)g}{2\sin\theta}$

$\Sigma \tau = 0$

$N_y \cdot \frac{L}{2} - T\sin\theta \frac{L}{2} = 0 \qquad N_y = T\sin\theta$

$\Sigma F_x = 0$

$N_x - T\cos\theta = 0 \qquad N_x = T\cos\theta$

$\Sigma F_y = 0$

$N_x + T\sin\theta - mg + M_y = 0 \rightarrow N_x + T\sin\theta = (M+m)g$

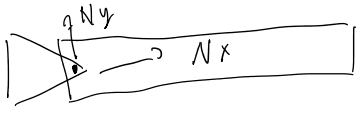
$T = \frac{(m+M)g}{2\sin\theta} < T_{crit} \quad \hookrightarrow \quad \sin\theta > \frac{(m+M)g}{2T_{crit}}$

$\sin\theta_{crit}$

$\theta > \theta_{crit}$

$\theta_{crit} = \sin^{-1}\left(\frac{(m+M)g}{2T_{crit}}\right)$

$N = T_{crit}$



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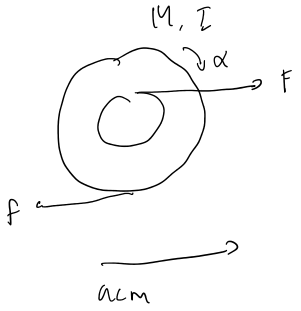


Conf. II

$\Sigma F = M \cdot a_{cm}$

$F - f = M\, a_{cm}$

$\Sigma \tau = I \alpha$

$F_r + fR = I\alpha$

$a_{cm} = \alpha R$

$\Sigma \tau = I \alpha$

$fR - Fr = I\alpha$

hasilnya

$a_t = \dfrac{1+\alpha}{1+k} \dfrac{F}{M}$

$a_t = \dfrac{1-\alpha}{1+k} \dfrac{F}{M}$

b) $\Sigma F = M\, a_{cm}$

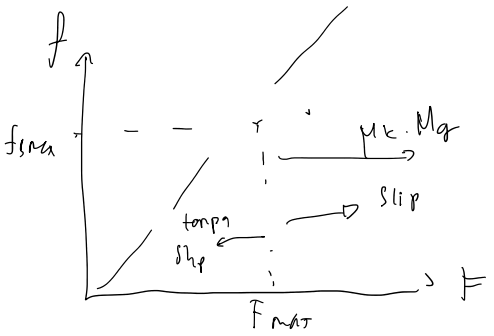
$F - f = M\, a_{cm}$

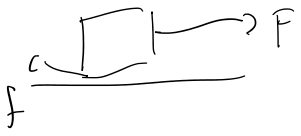
$F - f = \dfrac{1+\alpha}{1+k} F$

$f = \dfrac{k-\alpha}{1+k} F$

$\downarrow$

$f_{s\,max}$





$f_{s\,max} = \mu_s M g$

$F > f_{max}$ ⟶ bergerak ⟶ $f_{kinetik} = \mu_k M g$

$f = \dfrac{k-\alpha}{1+k} F \leq f_{s\,max}$

$\dfrac{k-\alpha}{1+k} F \leq \mu_s M g$

$F \leq \mu_s M g$

Cm Π

$F \leq \mu_s M g \dfrac{1+k}{k+\alpha}$