

$$\sin\theta = \frac{h}{L} \Rightarrow L = \frac{h}{\sin\theta}$$

$$* E_2 - E_1 = W_{\text{Fad}}, \quad E_3 = E_2 \quad **$$

$$E_1 = mgh, \quad E_2 = \frac{mv^2}{2}, \quad E_3 = \frac{kx^2}{2}$$

$$W_{\text{Fad}} = -\mu_d mg \cos\theta \cdot L$$

15.1.2025. Soluzioni

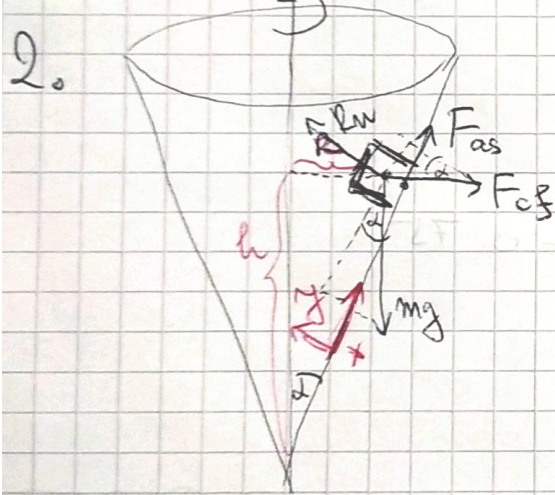
$$\Rightarrow * \frac{mv^2}{2} - mgh = -\mu_d mg \cos\theta \cdot \frac{h}{\sin\theta}$$

$$\Rightarrow v^2 = 2 \cdot g \cdot \left(h - \mu_d \frac{h}{\tan\theta} \right) \Rightarrow v = \sqrt{2gh \left(1 - \frac{\mu_d}{\tan\theta} \right)}$$

$$** \frac{mv^2}{2} = \frac{kx^2}{2} \Rightarrow x = v \cdot \sqrt{\frac{m}{k}} = \sqrt{\frac{2ghm \left(1 - \frac{\mu_d}{\tan\theta} \right)}{k}} = \sqrt{\frac{\frac{m}{k} \cdot g}{N/m}} = m$$

$$* |\vec{F}_{\text{as}}| \leq \mu_s |\vec{R}_n|$$

equilibrio



$$x: F_{\text{as}} + F_{\text{cf}} \sin\alpha - mg \cos\alpha = 0$$

$$y: R_n - F_{\text{cf}} \cos\alpha - mg \sin\alpha = 0$$

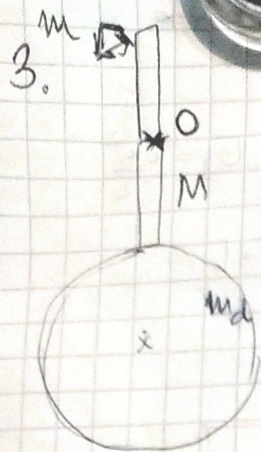
$$F_{\text{cf}} = m\omega^2 l, \quad R = l \cdot \tan\alpha$$

$$\Rightarrow x: F_{\text{as}} = mg \cos\alpha - m\omega^2 \cdot l \frac{\sin^2\alpha}{\cos\alpha} \cdot \sin\alpha$$

$$y: R_n = mg \sin\alpha + m\omega^2 \cdot l \frac{\sin\alpha}{\cos\alpha} \cdot \cos\alpha$$

$$\Rightarrow * \frac{|mg \cos\alpha - m\omega^2 \cdot l \frac{\sin^2\alpha}{\cos\alpha}|}{|mg \sin\alpha + m\omega^2 \cdot l \sin\alpha|} \leq \mu_s$$

$$\frac{|g \cos^2\alpha - \omega^2 l \sin^2\alpha|}{\sin\alpha (g + l\omega^2)} \leq \mu_s$$



$$\vec{L}_{prima} = \vec{L}_{dopo}$$

$$M v_0 \cdot R = I_{tot} \cdot \omega \Rightarrow \omega = \frac{M v_0 \cdot R}{I_{tot}}$$

$$I_{tot} = I_{asta} + I_{disco} + I_m =$$

$$= M \cdot \frac{(2R)^2}{12} + m_d \frac{R^2}{2} + m_d (2R)^2 + m R^2 =$$

$$= M \frac{(4R^2)}{12} + \frac{M}{3} \frac{R^2}{2} + \frac{M}{3} \cdot 4R^2 + \frac{M}{6} R^2 = \dots = 2MR^2$$

$$\Rightarrow \left\{ \omega = \frac{M}{6} \cdot \frac{v_0 \cdot R}{2MR^2} = \frac{v_0}{12R} \right\}$$

4. $1 - \frac{T_b}{T_a} = 0.25 \Rightarrow \frac{T_b}{T_a} = 0.75$

$$1 - \frac{(T_b - 70)}{T_a} = 0.5$$

~~scribble~~

$$0.75 - \frac{70K}{T_a} = 0.5 \Rightarrow T_a = \frac{70K}{0.25} = 280K$$

$$T_b = 210K$$

$$\eta_1 = 1 - \frac{210}{280} = 0.25$$

$$\eta_2 = 1 - \frac{140}{280} = 0.5$$