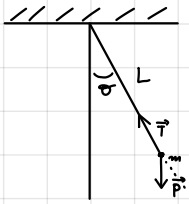
ESERCITAZIONE

ESERCIZIO 1



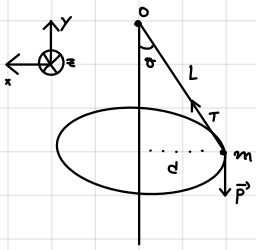
$\vec{T} + \vec{P} = m\vec{a}$ $\quad \begin{cases} -mg\sin\theta = ma_t \\ -mg\cos\theta + T = ma_n \end{cases}$ $\quad \begin{cases} -mg\sin\theta = m\dfrac{d^2 s(t)}{dt^2} = Lm\dfrac{d^2\theta}{dt^2} \\ -mg\cos\theta + T = \dfrac{m}{L}\left(\dfrac{ds(t)}{dt}\right)^2 = mL\left(\dfrac{d\theta(t)}{dt}\right)^2 \end{cases}$

Considerando piccole oscillazioni:

$\begin{cases} -mg\overset{\theta(t)}{\sin\theta} = mL\dfrac{d^2\theta(t)}{dt^2} \end{cases}$ $\qquad \dfrac{d^2\theta(t)}{dt^2} + \dfrac{g}{L}\theta(t) = 0 \rightarrow \theta(t) = \theta(0)\cos\left(\sqrt{\dfrac{g}{L}}\,t\right)$

Il periodo sarà: $T = 2\pi\sqrt{\dfrac{L}{g}} \Rightarrow$ $\begin{cases} nT = 61 \text{ min} \\ nT' = 60 \text{ min} \end{cases} \rightarrow \dfrac{T'}{T} = \dfrac{60}{61} = \sqrt{\dfrac{L'}{L}} \Rightarrow L' = \left(\dfrac{60}{61}\right)^2 L$

ESERCIZIO 2



d? $\quad T$? $\quad m = 5\,Kg \quad L = 5\,m \quad \omega = 1{,}5\ \frac{rad}{s}$ $\quad$ conil θ

$m\vec{g} + \vec{T} = m\vec{a}$ $\quad \begin{cases} T\sin\theta = m\omega^2 d \\ -mg + T\cos\theta = 0 \\ /// \end{cases}$ $\quad$ $(d = L\sin\theta)$ $\quad \begin{cases} T = m\omega^2 L = 56{,}25\ N \\ \cos\theta = g/\omega^2 L \end{cases}$

$d = L\sin\theta = L\sqrt{1-\cos^2\theta} = L\sqrt{1-\dfrac{g^2}{\omega^4 L^2}} = 2{,}45\ m$