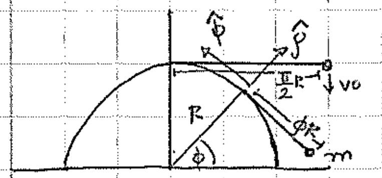
Pauta Ej 2 - 2012



(NO HAY GRAVEDAD, NI ROCE)

(a) $\vec{r} = R\hat{\rho} - \phi R\hat{\phi}$

1.0 p. $\vec{v} = \cancel{R\dot{\phi}\hat{\phi}} - \cancel{R\dot{\phi}\hat{\phi}} + \phi\dot{\phi}R\hat{\rho} = \phi\dot{\phi}R\hat{\rho}$

$\vec{a} = (\dot{\phi}^2 R + \phi\ddot{\phi}R)\hat{\rho} + \phi\dot{\phi}^2 R\hat{\phi}$

$v = \phi\dot{\phi}R$, $\dfrac{dv}{dt} = R(\dot{\phi}^2 + \phi\ddot{\phi})$

(b) $\sum \vec{F} = T\hat{\phi} = m\cdot\vec{a} = m\cdot\{(\dot{\phi}^2 R + \phi\ddot{\phi}R)\hat{\rho} + \phi\dot{\phi}^2 R\hat{\phi}\}$

1.0 p. $(\hat{\phi})$ $T = m\phi\dot{\phi}^2 R$

$(\hat{\rho})$ $m(\dot{\phi}^2 R + \phi\ddot{\phi}R) = 0$

1.5 p. (c) de $(\hat{\rho})$, $\dot{\phi}^2 + \phi\ddot{\phi} = 0$ pero $\dot{\phi}^2 + \phi\ddot{\phi} = (\phi\dot{\phi})' = 0$

$\mapsto$ $\phi\dot{\phi}$ = constante = c

pero $\phi\dot{\phi} = \left(\dfrac{\phi^2}{2}\right)' = c$ $(*)$

1.5 p. (d) $\vec{v} = \phi\dot{\phi}R\hat{\rho} = cR\hat{\rho}$, pero como $\vec{v}(0) = -v_0\hat{j} = -v_0\hat{\rho} = cR\hat{\rho}$

notar que en $t=0$ $\hat{\rho}$ y $\hat{j}$ tienen la misma dirección

De aquí, $c = \dfrac{-v_0}{R}$.

En $(*)$, (integrando) $\left.\dfrac{\phi^2}{2}\right|_{t=0}^{t} = \left. ct\right|_{t=0}^{t}$

$\dfrac{\phi^2}{\cancel{2}} - \dfrac{(\pi/2)^2}{\cancel{2}} = 2ct$ $\mapsto$ $\phi(t) = \sqrt{-\dfrac{2V_0 t}{R} + \dfrac{\pi^2}{4}}$ //

Dado que $\vec{v} = \phi\dot{\phi}R\hat{\rho} = cR\hat{\rho} = -v_0\hat{\rho}$

1.0 p. (e) de $(\hat{\phi})$ $\vec{T} = m\phi\dot{\phi}^2 R\hat{\phi} = m\dfrac{c^2}{\phi}R\hat{\phi} = \dfrac{mV_0^2}{R\sqrt{\frac{\pi^2}{4} - \frac{2V_0 t}{R}}}\hat{\phi}$: creciente con t

$\vec{\ell} = m\vec{r}\times\vec{v} = m(R\hat{\rho} - \phi R\hat{\phi})\times(\phi\dot{\phi}R\hat{\rho}) = mR^2\phi^2\dot{\phi}\,\hat{k}$

$= mR^2 c\,\phi\,\hat{k}$

$= -mR\,V_0\sqrt{\dfrac{\pi^2}{4} - \dfrac{2V_0 t}{R}}\,\hat{k}$: crece con t

Aux: Belén Zúñiga.

(Aunque $|\vec{\ell}|$ decrece) (Considerando signo) //