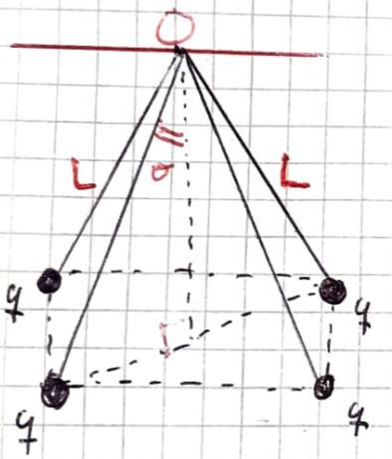
Preparcial 3

Problema 27. Cálculo de interés en física:



$\sum F_x = 0$

$F_1 = \dfrac{kq^2}{(\sqrt{2}L\sin\theta)^2}$ $\quad F_2 = \dfrac{kq^2}{(2L\sin\theta)^2}$

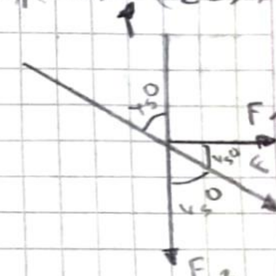
$\sum F_y = 0$

$-mg + T\cos(\theta) = 0$

$T\cos(\theta) = mg \rightarrow T = \dfrac{mg}{\cos\theta}$

$* \; kq^2\left(\dfrac{1}{(2L\sin\theta)^2} + \dfrac{2(\sqrt{2}/2)}{(\sqrt{2}L\sin\theta)^2}\right)$

$F = \dfrac{kq^2}{(2L\sin\theta)^2} + \dfrac{2kq^2\cos(45)}{(\sqrt{2}L\sin\theta)^2}$



$\Rightarrow kq^2\left(\dfrac{1}{(2L\sin\theta)^2} + \dfrac{\sqrt{2}}{(\sqrt{2}L\sin\theta)^2}\right) = T\sin\theta \rightarrow kq^2\left(\dfrac{1}{4L^2\sin^2\theta} + \dfrac{\sqrt{2}}{2}\dfrac{1}{L^2\sin^2\theta}\right)$

$\rightarrow \dfrac{kq^2}{L^2}\left(\dfrac{1}{4\sin^2\theta} + \dfrac{\sqrt{2}}{2}\dfrac{1}{\sin^2\theta}\right) = mg\tan\theta$

$\hookrightarrow \dfrac{kq^2}{L^2}\left(\dfrac{1}{4} + \dfrac{\sqrt{2}}{2}\right)\dfrac{1}{\sin^2\theta} = mg\dfrac{\sin\theta}{\cos\theta} \rightarrow \dfrac{kq}{L^2 mg}\left(\dfrac{1}{4} + \dfrac{\sqrt{2}}{2}\right)\cos\theta = \sin^3(\theta)$

- $-mg + T\cos(\theta) = 0$
- $\dfrac{kq}{L^2 mg}\left(\dfrac{1}{4} + \dfrac{\sqrt{2}}{2}\right)\cos\theta - \sin^3(\theta) = 0$