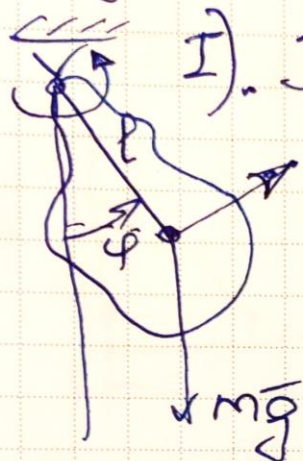


Работа законов и формализмов



Рыцарский маятник



I). J - момент инерции

m - масса, l - плечо

$$\bar{K} = J\bar{\omega} ;$$

$$\omega = \dot{\varphi}$$

$$\bar{M}^e = \bar{M}(m\bar{g}) = -mgl \sin \varphi$$

Теорема об изменении кинетического момента:

$$\frac{d}{dt} \bar{K} = \bar{M}^e$$

$$\frac{d}{dt} (J\dot{\varphi}) = -mgl \sin \varphi$$

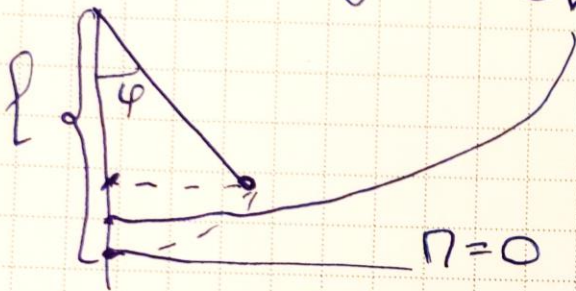
$$J\ddot{\varphi} + mgl \sin \varphi = 0$$

$$\ddot{\varphi} + \frac{mgl}{J} \sin \varphi = 0$$



II). $T = \frac{1}{2} J \dot{\varphi}^2$

$\Pi = mgh = -mgl \cos \varphi + l$



$L = T - \Pi$

$L = \frac{1}{2} J \dot{\varphi}^2 + mgl \cos \varphi - l$

φ - е Лагранжа II-го рода:

$$\left[\frac{d}{dt} \frac{\partial L}{\partial \dot{q}} - \frac{\partial L}{\partial q} = 0 \right] (*)$$

$q = \varphi ;$

$\frac{\partial L}{\partial \varphi} = -mgl \sin \varphi$

$\frac{\partial L}{\partial \dot{\varphi}} = J \dot{\varphi} ; \quad \frac{d}{dt} \left(\frac{\partial L}{\partial \dot{\varphi}} \right) = J \ddot{\varphi}$

$J \ddot{\varphi} + mgl \sin \varphi = 0$

$\ddot{\varphi} + \frac{mgl}{J} \sin \varphi = 0$

