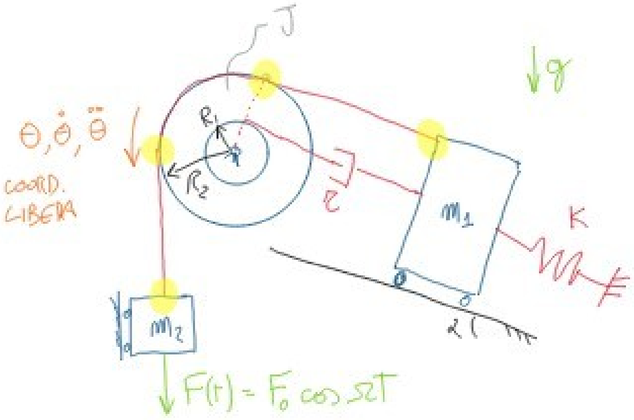
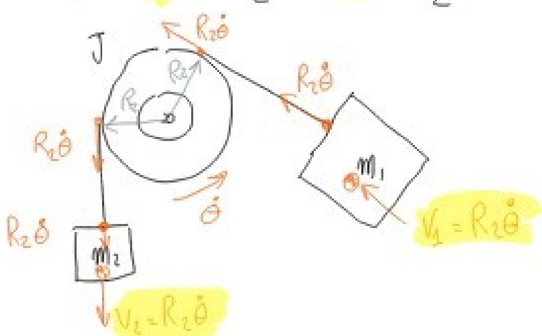


DOMANDA

SCRIVERE EQ DI MOTO CON LAGRANGE

$$\frac{d}{dt}\left(\frac{\partial E_c}{\partial \dot\theta}\right) - \frac{\partial E_c}{\partial \theta} + \frac{\partial D}{\partial \dot\theta} + \frac{\partial V}{\partial \theta} = \frac{\delta L}{\delta \theta}$$

$$E_c = \frac{1}{2} m_1 V_1^2 + \frac{1}{2} m_2 V_2^2 + \frac{1}{2} J \dot\theta^2 = \frac{1}{2} \underbrace{\left(m_1 R_2^2 + m_2 R_2^2 + J\right)}_{J^*} \dot\theta^2$$



$$\Downarrow$$

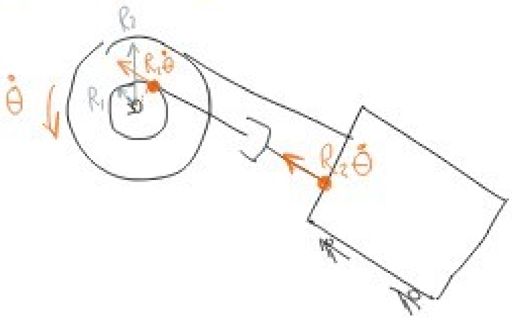
$$E_c = \frac{1}{2} J^* \dot\theta^2$$

$$\frac{\partial E_c}{\partial \theta} = 0$$

$$\frac{\partial E_c}{\partial \dot\theta} = J^* \dot\theta \xrightarrow{d/dt} J^* \ddot\theta$$

$$D = \frac{1}{2} r \dot{\Delta l}^2$$

$$\dot{\Delta l} = +R_1\dot\theta - R_2\dot\theta = (R_1 - R_2)\dot\theta =$$
$$= -(R_2 - R_1)\dot\theta$$



$$D = \frac{1}{2} \underbrace{r (R_2 - R_1)^2}_{r^*} \dot\theta^2$$

$$= \frac{1}{2} r^* \dot\theta^2$$

$$\frac{\partial D}{\partial \dot\theta} = r^* \dot\theta$$

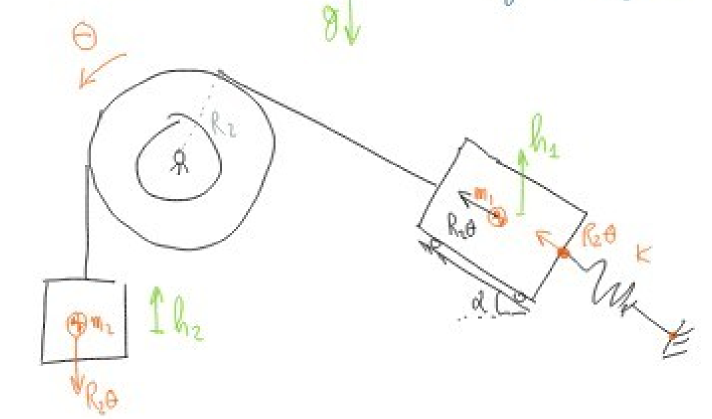
$$V = \underset{\substack{\uparrow \\ \text{ELASTICA}}}{V_k} + \underset{\substack{\uparrow \\ \text{GRAVITAZIONALE}}}{V_g}$$

$$V_k = \frac{1}{2} K \, \Delta l^2$$

$$V_g = m_1 g \, h_1 + m_2 g \, h_2 + \cancel{V_{g\,DISCO}}$$

COSTANTE

$$\frac{\partial V_{g\,DISCO}}{\partial \theta} = 0$$



$$\Delta l = R_2 \theta$$

$$h_1 = R_2 \theta \sin\alpha$$

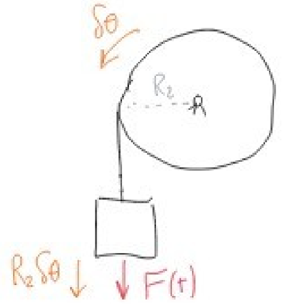
$$h_2 = -R_2 \theta$$

$$V = \frac{1}{2}\left(K R_2^2\right)\theta^2 + m_1 g R_2 \sin\alpha \, \theta + m_2 g (-R_2)\, \theta =$$

$$= \frac{1}{2} K^* \theta^2 + (m_1 \sin\alpha - m_2) g R_2 \, \theta$$

$$\frac{\partial V}{\partial \theta} = K^* \theta + (m_1 \sin\alpha - m_2) g R_2$$

$$\delta L = \vec{F}(t) \cdot \delta \vec{s} = \left(F(t) R_2\right) \delta\theta$$



<u>EQ DI MOTO</u>:

$$\frac{d}{dt}\left(\frac{\partial E_c}{\partial \dot\theta}\right) - \frac{\partial E_c}{\partial \theta} + \frac{\partial D}{\partial \dot\theta} + \frac{\partial V}{\partial \theta} = \frac{\delta L}{\delta \theta}$$

$$J^* \ddot\theta + r^* \dot\theta + K^* \theta + (m_1 \sin\alpha - m_2) R_2 g = F(t) R_2$$

$$J^* \ddot\theta + r^* \dot\theta + K^* \theta = \underbrace{(m_2 - m_1 \sin\alpha) R_2 g}_{\text{SOL. PARTICOLARE COSTANTE}} + \underbrace{(F_0 R_2) \cos \Omega t}_{\text{SOL. PARTICOLARE ARMONICA}}$$