

EL

$$x : \frac{d}{dt} \frac{\partial L}{\partial \dot{x}} - \frac{\partial L}{\partial x} - \lambda a_x = 0$$

$$\theta : \frac{d}{dt} \frac{\partial L}{\partial \dot{\theta}} - \frac{\partial L}{\partial \theta} - \lambda a_\theta = 0$$

$$r d\theta - dx = 0$$

\uparrow \uparrow
 a_θ a_x

$$\Rightarrow M \ddot{x} - Mg \sin \alpha + \lambda = 0 \quad \int \cdot \pi \ddot{x} - \pi g \sin \alpha + \pi r \ddot{\theta} = 0$$

$$\pi r \ddot{\theta} - \lambda r = 0$$

$$r \ddot{\theta} = \ddot{x} \Rightarrow r \ddot{\theta} = \ddot{x}$$

$$\Rightarrow 2\pi \ddot{x} = \pi g \sin \alpha$$

$$\Rightarrow \ddot{x} = \frac{g \sin \alpha}{2}$$

$$\Rightarrow \ddot{\theta} = \frac{g \sin \alpha}{2r}$$