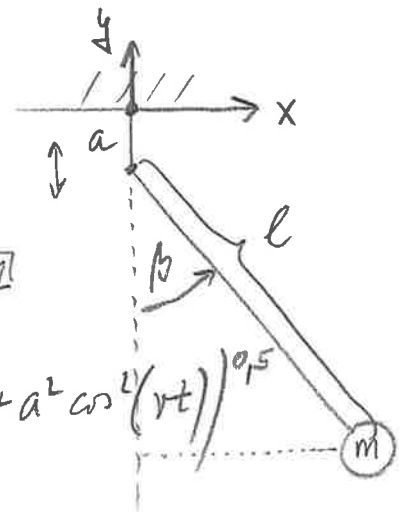


# KAPITEL A

$$\left. \begin{aligned} x &= l \cdot \sin \beta \\ y &= -l \cdot \cos \beta - a \cos(\nu \cdot t) \end{aligned} \right\} \beta = \beta(t)$$



nicht  
not-  
wendig

$$\left\{ \begin{aligned} r &= \sqrt{x^2 + y^2} = \sqrt{(l \sin \beta)^2 + (-l \cos \beta - a \cos(\nu t))^2} \\ r &= \left( \underbrace{l^2 \sin^2 \beta + l^2 \cos^2 \beta}_{= l^2} - 2al \cos \beta \cos(\nu t) + a^2 \cos^2(\nu t) \right)^{0,5} \end{aligned} \right.$$

$$\dot{x} = l \cdot \cos \beta \cdot \dot{\beta}$$

$$\dot{y} = +l \sin \beta \cdot \dot{\beta} + a \sin(\nu t) \cdot \nu$$

$$v^2 = \dot{x}^2 + \dot{y}^2 = \underbrace{l^2 \cos^2 \beta \dot{\beta}^2 + l^2 \sin^2 \beta \dot{\beta}^2}_{= l^2 \dot{\beta}^2} + 2al\nu \sin \beta \sin(\nu t) \cdot \dot{\beta} + a^2 \nu^2 \sin^2(\nu t)$$

$$E_{\text{KIN}} = \frac{m}{2} v^2 = \frac{m l^2}{2} \dot{\beta}^2 + mal\nu \sin(\nu t) \cdot \sin \beta \cdot \dot{\beta} + \frac{m a^2 \nu^2}{2} \sin^2(\nu t)$$

$$E_{\text{POT}} = -mg(l \cos \beta + a \cos(\nu t))$$

$$L = E_{\text{KIN}} - E_{\text{POT}} \dots \text{Lagrange - Fkt}$$

$$\frac{d}{dt} \frac{\partial L}{\partial \dot{\beta}} - \frac{\partial L}{\partial \beta} = 0$$

$$\frac{\partial L}{\partial \dot{\beta}} = \frac{m l^2}{2} \dot{\beta} + mal\nu \sin(\nu t) \cdot \sin \beta$$

$$\frac{d}{dt} \frac{\partial L}{\partial \dot{\beta}} = m l^2 \ddot{\beta} + mal\nu \omega(\nu t) \cdot \nu \cdot \sin \beta + mal\nu \sin(\nu t) \cdot \cos \beta \cdot \dot{\beta}$$

$$\frac{\partial L}{\partial \beta} = mal\nu \sin(\nu t) \cdot \cos \beta \cdot \dot{\beta} - mgl \sin \beta$$

$$\frac{d}{dt} \frac{\partial L}{\partial \dot{\beta}} - \frac{\partial L}{\partial \beta} = m l^2 \ddot{\beta} + mal\nu^2 \cos(\nu t) \cdot \sin \beta + mgl \sin \beta = 0 \quad (:\cdot m l^2)$$

$$\ddot{\beta} + \left( \frac{g}{l} + \frac{a \nu^2 \cos(\nu t)}{l} \right) \cdot \sin \beta = 0$$