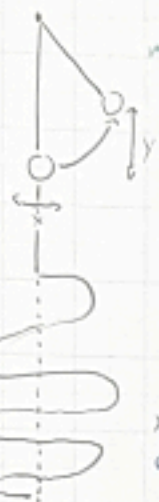


Übung 7 - Aufgabe 1)

mathematisches Pendel



$$x(t) = \hat{x} \cos(2\pi f t)$$

cos, sin \rightarrow harmonisch

$$\sum \vec{F} = m \vec{a}$$



$$x: \sum F_x = m a_x$$

$$y: \sum F_y = m a_y$$

$$a_{\text{rad}} = a_{\text{p}} = a \cdot r = \ddot{\varphi} \cdot r = \ddot{\varphi} \cdot L$$

$$F_{gy} = -m g \cdot \sin \varphi = -m \cdot \ddot{\varphi} \cdot L$$

$$\Leftrightarrow 0 = L \cdot \ddot{\varphi} + g \cdot \sin \varphi$$

$$\Leftrightarrow 0 = L \cdot \ddot{\varphi} + g \cdot \varphi$$

$$\Leftrightarrow \ddot{\varphi} + \frac{g}{L} \varphi = 0$$



Feder-Masse-Pendel

$$T = \frac{2\pi}{\omega_0}$$

$$\omega = \sqrt{\frac{k}{m}}$$

$$\omega = 2\pi f = 2\pi \cdot \frac{1}{T} = \frac{2\pi}{T} \Leftrightarrow T = \frac{2\pi}{\omega}$$

$$= \frac{2\pi}{\sqrt{\frac{k}{m}}} = 2\pi \sqrt{\frac{m}{k}}$$

$$y'' + \omega_0^2 y = 0$$



physikalisches Pendel

$$T = 2\pi \sqrt{\frac{I}{m g h}}$$

$$T = 2\pi \sqrt{\frac{I}{m g h}}$$

$$\omega = \sqrt{\frac{g}{L}} \quad T = \frac{2\pi}{\omega} = \frac{2\pi}{\sqrt{\frac{g}{L}}} = 2\pi \sqrt{\frac{L}{g}}$$