

$$\frac{q_0}{l} = 4\pi^2$$

$$\omega_{\text{mot}}^2 = \omega_{\text{grada}}^2$$

$$l = \frac{q_0}{4\pi^2} = 0,25 = 25 \text{ mm}$$

$$ma = -kx - b\dot{x}$$

$$m = 1,1 \text{ kg}$$

$$k = 8 \text{ N/m}$$

$$b = 0,3 \text{ kg/s}$$

$$A_0 = 0,12 \text{ m}$$

$$\delta = \frac{b}{2m} < \omega_0$$

$$x = A_0 e^{-\delta t} \sin(\omega t + \varphi)$$

$$t=0, \quad x_0 = A_0 \sin \varphi$$

$$\sin \varphi = 1$$

$$\varphi = \frac{\pi}{2}$$

$$x = A_0 e^{-\delta t} \sin(\omega t + \frac{\pi}{2})$$

$$x = \frac{1}{4} A_0$$

$$\omega = \sqrt{\omega_0^2 - \delta^2} = \sqrt{\frac{k}{m} - \frac{b^2}{4m^2}}$$

$$A(t) = A_0 e^{-\delta t}$$

$$\frac{1}{4} A_0 = A_0 e^{-\delta t}$$

$$e^{-\delta t} = \frac{1}{4}$$

$$\delta t = \ln 4$$

$$t = \frac{\ln 4}{\delta} = \frac{2m \ln 4}{b}$$

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

$$\frac{t}{T} = \frac{\frac{2m \ln 4}{b}}{\frac{2\pi}{\omega}} = \frac{\omega m \ln 4}{\pi b}$$

$$\frac{t}{T} = 4,36 \text{ perioden}$$