

Beweise: die Periodendauer T eines Federpendels $= 2\pi * \sqrt{\frac{m}{D}}$

$$F_G = M * a$$

$$F_{Feder} = -D * s$$

Kräftegleichgewicht:

$$F_{Feder} = F_g$$

$$-D * s = m * a = m * s''$$

$$-D * s(t) = m * a(t) = m * s''$$

$$s(t) = \hat{s} * \sin(\omega * t)$$

$$v(t) = s'(t) = \omega * \hat{s} * \cos(\omega * t)$$

$$a(t) = s''(t) = -\omega^2 * \hat{s} * \sin(\omega * t)$$

$$-\omega^2 * \hat{s} * \sin(\omega * t) * m = -D * \hat{s} * \sin(\omega * t)$$

$$-\omega^2 * m = -D$$

$$\omega^2 = \frac{D}{m}$$

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

$$\frac{2\pi}{T} = \sqrt{\frac{D}{m}}$$

$$T = 2\pi * \sqrt{\frac{m}{D}} \text{ q.e.d.}$$