Formeln Physik

$$\begin{array}{lll} a = konstant & \psi = konstant & \omega = konstant = \frac{2\pi}{T} \\ v(t) = v_0 + at & \omega(t) = \omega_0 + \psi t & \phi(t) = \phi_0 + \omega t \\ x(t) = x_0 + v_0 t + \frac{1}{2}at^2 & \phi(t) = \phi_0 + \omega_0 t + \frac{1}{2}\psi t^2 & v = \frac{2\pi R}{T} = \omega R \\ v^2 = v_0^2 + 2a(x - x_0) & \omega^2 = \omega_0^2 + 2\psi(\phi - \phi_0) & |a_r| = \frac{v^2}{R} = \omega^2 R \end{array}$$

$$v_t = R\omega \qquad a_t = R\psi \qquad |\vec{F}_R| = \mu_R|\vec{N}|$$

$$W = \int \vec{F} \cdot d\vec{r} \qquad W_{net} = \Delta K \qquad \bar{P} = \frac{\Delta E}{\Delta t}$$

$$E^i_{ges} + W_{ext} = K^i + E^i_{pot} + E^i_{sp} + W_{ext} = E^f_{ges} = K^f + E^f_{pot} + E^f_{sp}$$

$$P(t) = \frac{\vec{F} \cdot d\vec{r}}{dt} = \vec{F} \cdot \vec{v} = |\vec{F}||\vec{v}|cos(\alpha)$$

$$K = \frac{1}{2}mv^2 \qquad E_{pot} = mgh \qquad E_{sp} = \frac{1}{2}cx^2 \qquad K_{rot} = \frac{1}{2}J\omega^2$$

$$\vec{M} = J\vec{\psi} \qquad \vec{M} = \vec{r} \times \vec{F} = |\vec{r}||\vec{F}|sin(\alpha) \qquad J = \sum_i m_i r_i^2 = \int r^2\, dm$$

$$J = J_{sp} + ma^2 \qquad x_{sp} = \frac{\sum m_i x_i}{\sum m_i} \qquad P = \rho g h \qquad F_A = \rho_{fl} g V$$

$$m\ddot{x} = -cx \qquad F_{sp} = -cx \qquad x(t) = a\,cos(\omega_0 t) + b\,sin(\omega_0 t) = A\,cos(\omega_0 t - \phi) \qquad \omega_0 = \sqrt{\frac{c}{m}}$$

$$m\ddot{x} + d\dot{x} + cx = 0 \qquad x(t) = e^{-\delta t}(a\,cos(\omega t) + b\,sin(\omega t)) \qquad \omega = \sqrt{\omega_0^2 - \delta^2}$$

$$\delta = \frac{d}{2m} \qquad \Lambda = \delta T \qquad T = 2\pi\sqrt{\frac{l}{g}} \qquad T = 2\pi\sqrt{\frac{l}{g}}\sqrt{\frac{J}{ml^2}}$$

Konstante Amplitude der Erregerkraft: $m\ddot{x} + d\dot{x} + cx = F_0 cos(\Omega t)$

$$x(t) = A(\Omega)cos(\Omega t - \phi(\Omega)) \qquad tan(\phi(\Omega)) = \frac{\frac{d}{m}\Omega}{\frac{c}{m} - \Omega^2}$$

$$A(\Omega) = \frac{F_0/m}{\sqrt{(\frac{c}{m} - \Omega^2)^2 + \frac{d^2}{m^2}\Omega^2}} \qquad \Omega_R = \sqrt{\frac{c}{m} - \frac{d^2}{2m^2}} = \sqrt{\omega_0^2 - 2\delta^2}$$

dynamische Fremderregung (Unwucht): $F_0 \rightarrow m_u r \Omega^2$ $\qquad \Omega_R = \frac{\sqrt{\frac{c}{m_{ges}}}}{\sqrt{1 - \frac{d^2}{2m_{ges}c}}}$

$$c = \lambda f = \frac{\lambda}{T} \qquad I = \frac{P}{Flaeche} \qquad I = \frac{P}{4\pi r^2}(Punktquelle) \qquad c = \sqrt{\frac{F}{\mu}} \qquad f_{schweb} = |f_1 - f_2|$$

$$\Psi(x,t) = A\,cos(kx - \omega t - \phi) = A\,cos(k(x - ct) - \phi) \qquad k = \frac{2\pi}{\lambda}$$

$$A = \sqrt{A_1^2 + A_2^2 + 2A_1A_2cos(\phi_2 - \phi_1)} \qquad cos(\alpha) + cos(\beta) = 2cos(\frac{\alpha + \beta}{2})cos(\frac{\alpha - \beta}{2})$$

Seil beide Enden fest: $L = n\frac{\lambda_n}{2}$

Luftsäule, offen-geschlossen: $L = (2n - 1)\frac{\lambda_{2n-1}}{4}$

Doppelspalt: $d\,sin(\alpha_m) = m\lambda$ (Max) Einzelspalt: $w\,sin(\beta_n) = n\lambda$ (Min)