

Trillingen

EHB

- Differentiaalvergelijking

$$m\ddot{u} = -ku$$

- Dynamica

$$u(t) = A \sin(\omega_0 t + \varphi)$$

$$\rightarrow v = \frac{du}{dt} = A \omega_0 \cos(\omega_0 t + \varphi)$$

$$\rightarrow a = \frac{d^2u}{dt^2} = -A \omega_0^2 \sin(\omega_0 t + \varphi)$$

- Energievergelijking

$$E_{mech} = E_{kin} + E_{pot}$$

$$\frac{1}{2} k A^2 = \frac{1}{2} m v^2 + \frac{1}{2} k u^2$$

→ Invloed van veermassa:

$$m \Rightarrow m + \frac{m_v}{3}$$

$$\omega_0^2 = \frac{k}{m}$$

$$v_{\max} = A \omega_0$$

$$T_0 = 2\pi \sqrt{\frac{m}{k}}$$

$$a_{\max} = A \omega_0^2$$

Rotatietrillingen

1. Torsieslinger

$$I_{MM} \frac{d^2\vartheta}{dt^2} = -C \vartheta$$

$$T = 2\pi \sqrt{\frac{I}{C}}$$

2. Fysische slinger

$$\frac{d^2\vartheta}{dt^2} + \frac{mgd}{I_0} \vartheta = 0$$

$$T = 2\pi \sqrt{\frac{I_0}{mgd}}$$

*Wiskundige slinger

$$I_0 = ml^2$$

*Equivalentente lengte

$$l_{equiv} = \frac{I_0}{md}$$

$$*T = 2\pi \sqrt{\frac{l}{g}}$$

3. Omkeerbare slinger

$$T_{omk.sl.} = T_A = T_B$$