MIS: sažetak formula

Trigonometrijske funkcije (primjena na pravokutni trokut)

$$\sin(kuta) = \frac{\text{nasuprotna kateta}}{\text{hipotenuza}} \quad ; \quad \cos(kuta) = \frac{\text{priležeća kateta}}{\text{hipotenuza}} \quad ; \quad \text{tg}(kuta) = \frac{\text{nasuprotna kateta}}{\text{priležeća kateta}}$$

Vektori

$$\vec{v} = v_x\hat{\imath} + v_y\hat{\jmath} + v_z\hat{k} \quad ; \quad v = |\vec{v}| = \sqrt{v_x^2 + v_y^2 + v_z^2} \quad ; \quad \hat{v} = \frac{\vec{v}}{v}$$

Sile

2. Newtonov zakon	Gravitacijska sila	Težina tijela	Otpor zraka
$\vec{F} = \frac{d\vec{p}}{dt}$ $\Delta m = 0 \Longrightarrow \vec{F} = m\vec{a}$	$\vec{F_g} = m\vec{g}$ $g = \lvert\vec{g}\rvert \approx 9.81\ \text{ms}^{-2}$	$\vec{G} = m\vec{g}$	$\vec{F}_{OZ} = -Dv\vec{v}$ $D = \frac{\rho CA}{2}$
Sila opruge	**Sila gušenja**	**Sila trenja**	**Rezultantna sila**
$\vec{F} = -k\vec{x}$	$\vec{F} = -b\vec{v}$	$\vec{F}_{tr} = -\mu F_{\perp}\hat{v}$	$\vec{F} = \sum \vec{F}_i$

Simuliranje translacijskog gibanja pomoću Vensima

$$\vec{a} = \frac{\vec{F}}{m} \qquad \frac{d\vec{v}}{dt} = \vec{a} \qquad \frac{d\vec{s}}{dt} = \vec{v} \qquad \vec{s}(0) = \square \quad \vec{v}(0) = \square$$

Analiza gibanja pomoću Excela (analogno vrijedi za sve komponente)

0) Diskretizacija vremena (Δt dovoljno mali)

$$t_i = i \cdot \Delta t \quad ; \quad \Delta t = t_{i+1} - t_i \quad ; \quad i = 0,1,2,\ldots$$

1A) Poznati: $x_i = x(t_i)$

$$v_i = \frac{x_{i+1} - x_i}{\Delta t} \quad ; \quad a_i = \frac{v_{i+1} - v_i}{\Delta t}$$

1B) Poznati: $a_i = a(t_i)$, $v_0 = v(0)$, $x_0 = x(0)$

$$v_{i+1} = a_i \cdot \Delta t + v_i \quad ; \quad s_{i+1} = \frac{1}{2} \cdot a_i \cdot \Delta t^2 + v_i \cdot \Delta t + s_i$$

Serijski RLC strujni krug

$$I = \frac{dQ}{dt} \qquad \frac{dI}{dt} = \frac{d^2Q}{dt^2} \qquad L\frac{d^2Q}{dt^2} + R\frac{dQ}{dt} + \frac{Q}{C} = 0 \qquad \omega_d = \sqrt{\frac{1}{LC} - \left(\frac{R}{2L}\right)^2}$$

Linearna regresija (y=ax+b)

$$a = \frac{\overline{xy} - \overline{x} \cdot \overline{y}}{\overline{x^2} - \overline{x}^2} \qquad b = \overline{y} - a\overline{x} \qquad \sigma_a = \sqrt{\frac{1}{n}\left(\frac{\overline{y^2} - \overline{y}^2}{\overline{x^2} - \overline{x}^2} - a^2\right)} \qquad \sigma_b = \sigma_a\sqrt{\overline{x^2} - \overline{x}^2}$$