PHYS-A1110 Yliopistofysiikan perusteet (SCI)

Kaavat

$v_x(t) = v_{0x} + a_x t \quad (a_x \text{ vakio})$ $\qquad$ $\omega_z(t) = \omega_{0z} + \alpha_z t \quad (\alpha_z \text{ vakio})$

$x(t) = x_0 + v_{0x}t + \frac{1}{2}a_x t^2 \quad (a_x \text{ vakio})$ $\qquad$ $\theta(t) = \theta_0 + \omega_{0z}t + \frac{1}{2}\alpha_z t^2 \quad (\alpha_z \text{ vakio})$

$v_x^2 = v_{0x}^2 + 2a_x(x - x_0) \quad (a_x \text{ vakio})$ $\qquad$ $\omega_z^2 = \omega_{0z}^2 + 2\alpha_z(\theta - \theta_0) \quad (\alpha_z \text{ vakio})$

$$x = \int v\,dt \qquad v = \int a\,dt$$

$$a_\mathrm{r} = \frac{v^2}{r} \qquad \theta = \frac{s}{r} \qquad v = r\omega \qquad a_\mathrm{t} = r\alpha$$

$$\sum \vec{F} = m\vec{a} \qquad F_\mu = \mu N \qquad \sum \tau_z = I\alpha_z \qquad \tau = F\ell$$

$$W = \int_{s_1}^{s_2} \vec{F} \cdot d\vec{s} \qquad\qquad W = \int_{\theta_1}^{\theta_2} \tau_z\,d\theta$$

$$W = \Delta K \qquad W = -\Delta U \qquad \vec{F} = -\nabla U$$

$$K = \tfrac{1}{2}mv^2 \qquad\qquad K_\mathrm{rot} = \tfrac{1}{2}I\omega^2$$

$$P = \frac{dW}{dt} = \vec{F} \cdot \vec{v} \qquad\qquad P = \frac{dW}{dt} = \tau_z\omega_z$$

$$F_\mathrm{g} = \frac{Gm_1m_2}{r^2} \qquad U_\mathrm{g} = -\frac{Gm_1m_2}{r} \qquad \vec{F}_\mathrm{g} = m\vec{g} \qquad U_\mathrm{g} = mgh$$

$$F_\mathrm{j} = -kx \qquad U_\mathrm{j} = \tfrac{1}{2}kx^2$$

$$F_\mathrm{e} = \frac{kq_1q_2}{r^2} \qquad U_\mathrm{e} = \frac{kq_1q_2}{r} \qquad \vec{F}_\mathrm{e} = q\vec{E} \qquad U_\mathrm{e} = qEd$$

$$V = \frac{U}{q_0} \qquad V_{ab} = V_a - V_b = \int_a^b \vec{E}\cdot d\vec{\ell} \qquad \vec{E} = -\nabla V$$

$$I = \frac{dQ}{dt} \qquad R = \frac{V_{ab}}{I} \qquad C = \frac{Q}{V_{ab}} \qquad P = V_{ab}I\ (= I^2R)$$

$$\vec{p} = m\vec{v} \qquad \vec{J} = \vec{F}\Delta t = \Delta\vec{p} \qquad \vec{L} = I\vec{\omega} \qquad U = \frac{1}{2}CV_{ab}^2$$

$$\vec{r}_\mathrm{cm} = \frac{\sum_i m_i\vec{r}_i}{M} \qquad\qquad I = \sum_i m_i r_i^2$$

$$\sum \vec{F} = \frac{d\vec{p}}{dt} \qquad\qquad \sum \vec{\tau} = \frac{d\vec{L}}{dt}$$

Vakiot

Alkeisvaraus	e	=	$1{,}60{\cdot}10^{-19}$ C
Coulombin vakio	k	=	$8{,}99{\cdot}10^{9}$ N·m^2/C^2
Gravitaatiovakio	G	=	$6{,}67 \cdot 10^{-11}$ N · m^2/kg^2
Elektronin massa	m_e	=	$9{,}11{\cdot}10^{-31}$ kg
Normaali putoamiskiihtyvyys	g	=	9,81 m/s^2