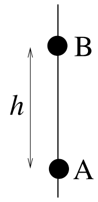
1. izpit iz Fizike II za študente Biokemije

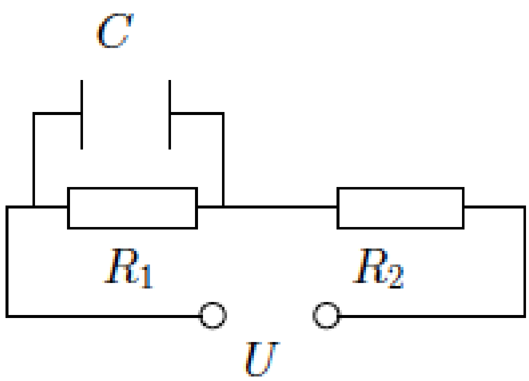
30. junij 2010

Naloge

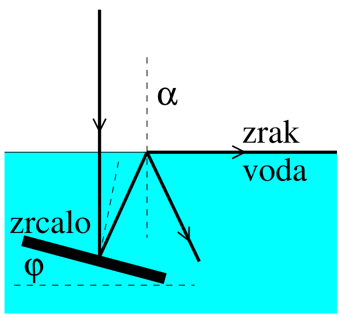
1. Na navpični vrvici sta nabiti kroglici z masama $m_A = m_B = 10$ g in nabojema $e_A = e_B = 1\ \mu$As. Kroglica A je na vrvico pritrjena, kroglica B pa se lahko vzdolž vrvice prosto giblje. Kroglico B dvignemo na višino $h = 50$ cm nad kroglico A in spustimo. S kolikšnim pospeškom se začne gibati?



2. Kolikšna je gonilna napetost U, če je na kondenzatorju s kapaciteto $C = 1$ µF shranjen naboj $e = 1$ µAs, in sta upornosti uporov $R_1 = 1\ \Omega$ in $R_2 = 2\ \Omega$?



3. Za najmanj kolikšen kot φ moramo nagniti pod vodno gladino potopljeno zrcalo, da se bo od zrcala odbiti žarek na vodni gladini popolnoma odbil? Lomni količnik vode je 1,33.



Enačbe

$v = \frac{\mathrm{d}s}{\mathrm{d}t} \quad a = \frac{\mathrm{d}v}{\mathrm{d}t} \quad \omega = \frac{\mathrm{d}\varphi}{\mathrm{d}t} \quad \alpha = \frac{\mathrm{d}\omega}{\mathrm{d}t}$

$s = s_0 + vt \quad \varphi = \varphi_0 + \omega t$

$s = s_0 + v_0 t + \frac{1}{2}at^2 \quad v = v_0 + at \quad \varphi = \varphi_0 + \omega_0 t + \frac{1}{2}\alpha t^2 \quad \omega = \omega_0 + \alpha t$

$\omega = 2\pi\nu \quad v = \omega r \quad a_r = \frac{v^2}{r} \quad a_t = \alpha r$

$\vec{F} = m\vec{a} \quad \vec{M} = J\vec{\alpha} \quad \vec{M} = \vec{r} \times \vec{F}$

$F_\mathrm{g} = mg \quad F_\mathrm{vzm} = kx \quad F_\mathrm{lep} = k_\mathrm{lep}F_\mathrm{p} \quad F_\mathrm{tr} = k_\mathrm{tr}F_\mathrm{p}$

$J_\mathrm{valj} = \frac{1}{2}mr^2 \quad J_\mathrm{krogla} = \frac{2}{5}mr^2 \quad J_\mathrm{palica} = \frac{1}{12}ml^2 \quad J_\mathrm{točka} = mr^2 \quad J = J^* + mr^{*2}$

$\Delta W = A' \quad W_\mathrm{kin} = \frac{1}{2}mv^2 \quad W_\mathrm{pot} = mgh \quad W_\mathrm{pr} = \frac{1}{2}kx^2 \quad W_\mathrm{rot} = \frac{1}{2}J\omega^2 \quad A = \vec{F} \cdot \vec{s}$

$\Delta\vec{G} = \vec{F}\Delta t \quad \vec{G} = m\vec{v}$

$\Delta\vec{\Gamma} = \vec{M}\Delta t \quad \vec{\Gamma} = \vec{r} \times \vec{G} = J\vec{\omega}$

$\vec{r}^* = \frac{\sum_i m_i \vec{r}_i}{\sum_i m_i}$

$F_\mathrm{g} = \frac{Gm_1m_2}{r^2}$

$p = p_0 + \rho gh \quad p + \frac{1}{2}\rho v^2 + \rho gh = \mathrm{konst.}$

$F_\mathrm{vzg} = \rho V g$

$F_\mathrm{u} = \frac{1}{2}C_\mathrm{u}\rho S v^2 \quad F_\mathrm{u} = 6\pi\eta r v \quad \mathrm{Re} = \frac{l\rho v}{\eta}$

$t_0 = 2\pi\sqrt{\frac{l}{g}} \quad t_0 = 2\pi\sqrt{\frac{m}{k}} \quad s = s_0 \sin\omega t \quad \omega = 2\pi\nu = \frac{2\pi}{t_0}$

$c = \lambda\nu \quad c = \sqrt{\frac{F}{\rho S}} \quad s = s_0 \sin(kx - \omega t) \quad k = \frac{2\pi}{\lambda}$

$s_1 - s_2 = N\lambda \quad s_1 - s_2 = \left(N + \frac{1}{2}\right)\lambda \quad d\sin\alpha = N\lambda \quad d\sin\alpha = \left(N + \frac{1}{2}\right)\lambda$

$\frac{\Delta l}{l} = \frac{1}{E}\frac{F}{S} \quad \frac{\Delta l}{l} = \alpha\Delta T \quad \frac{\Delta V}{V} = \beta\Delta T \quad \beta = 3\alpha$

$pV = \frac{m}{M}RT \quad pV^\kappa = \mathrm{konst.} \quad \kappa = \frac{c_p}{c_V} \quad c_p = c_V + \frac{R}{M} \quad W_\mathrm{n} = mc_V T$

$\Delta W = A' + Q \quad A = -\int_{V_1}^{V_2} p\,\mathrm{d}V \quad Q = mc\Delta T \quad Q = C\Delta T \quad Q = mq_\mathrm{t} \quad Q = mq_\mathrm{i}$

$\eta = \frac{A_\mathrm{opr}}{Q_\mathrm{dov}} \quad \eta_\mathrm{C} = 1 - \frac{T_1}{T_2}$

$P = S\lambda\frac{\Delta T}{d}$

$\vec{F}_\mathrm{e} = e\vec{E} \quad F_\mathrm{e} = \frac{e_1e_2}{4\pi\varepsilon\varepsilon_0 d^2} \quad W_\mathrm{e} = eV \quad V = \frac{e}{4\pi\varepsilon\varepsilon_0 d}$

$E = \frac{\sigma}{2\varepsilon\varepsilon_0} \quad E = \frac{\sigma}{\varepsilon\varepsilon_0} \quad e = CU \quad C = \frac{\varepsilon\varepsilon_0 S}{d} \quad C = C_1 + C_2 \quad \frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} \quad W_\mathrm{e} = \frac{e^2}{2C}$

$U = RI \quad R = \frac{\xi l}{S} \quad R = R_1 + R_2 \quad \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} \quad P = UI$

$\mathbf{F} = I\mathbf{l} \times \mathbf{B} \quad B = \frac{\mu_0 I}{2\pi r} \quad B = \frac{\mu_0 NI}{l} \quad \mathbf{F} = e\mathbf{E} + e\mathbf{v} \times \mathbf{B} \quad \mathbf{M} = \mathbf{p}_m \times \mathbf{M} \quad \mathbf{p}_m = NI\mathbf{S}$

$U_i = -\frac{\mathrm{d}\Phi_m}{\mathrm{d}t} \quad \Phi_m = N\mathbf{S} \cdot \mathbf{B} \quad I_{ef} = \frac{I_0}{\sqrt{2}} \quad U_{ef} = \frac{U_0}{\sqrt{2}} \quad \bar{P} = I_{ef}U_{ef} \quad \omega = \frac{1}{\sqrt{LC}} \quad L = \frac{\mu_0 N^2 S}{l}$

$k_1 \sin\alpha = k_2 \sin\beta \quad \frac{1}{a} + \frac{1}{b} = \frac{1}{f} \quad \frac{h_1}{h_2} = \frac{a}{b}$