7.1.

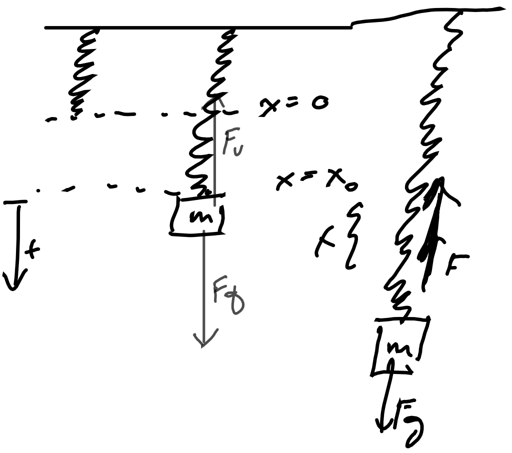
$l = 1\,m$

$k = 500\,N/m$

$m = 8\,kg$

$a_0 = 0{,}1\,m$

$x_0 = ?$



$$kx_0 = mg$$

$$x_0 = \frac{mg}{k}$$

$$F_g + F_{vz} = m \cdot \vec{a} = \ddot{x}(t)$$

$$+mg - k(x_{(t)} + x_0) = m\vec{a}(t)$$

$$\underbrace{mg - kx_0}_{=0} - kx = m\ddot{x}$$

$$-kx = m\ddot{x}$$

$$\ddot{x} = \frac{-kx}{m} \qquad -\frac{k}{m} = \omega_0^2$$

$$x(t) = \sin(\omega t) \cdot A + B\cos(\omega t)$$

začetni pogoji:

$$x(0) = \vec{a}_0$$

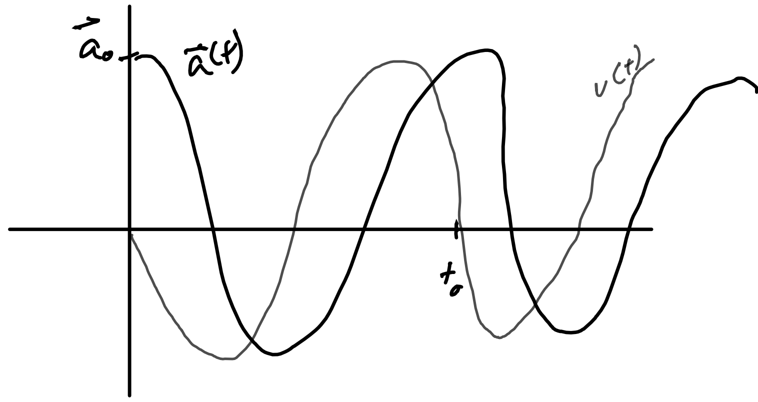
$$\vec{a}_0 = x(0) = B$$

$$v(t) = \dot{x}(t)$$

$$v(0) = \dot{x}(0) = A\omega\cos(\omega t) - B\omega\sin(\omega t)$$

$$0 = A\omega \Rightarrow A = 0$$

$$x(t) = a_0\cos(\omega t)$$



$$\cos(\omega t) = 1$$

$$\omega t_0 = 2\pi \qquad t_0 = \frac{2\pi}{\omega_0} = \frac{2\pi\sqrt{m}}{\sqrt{k}}$$

$$\omega_0 = \sqrt{\frac{k}{m}} \quad \ldots \text{ kotna frekvenca}$$

$$\omega_0 = 7{,}9\ /s$$

Energija nihanja

$$W = \frac{mv^2}{2} + mg(-x) + \frac{k(x+x_0)^2}{2} - \frac{k}{2}x_0^2$$

$$= \frac{mv^2}{2} + \frac{1}{2}kx^2 = \frac{1}{2}ka_0^2 = 2{,}5\ \mathrm{J}$$

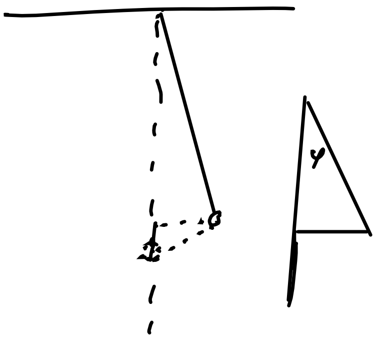
$l = 3m$

$\varphi_0 = 3{,}5^0$

$t = 15\,s$

$N = ?$

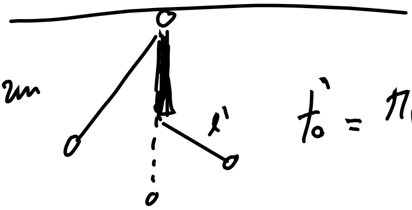
$V_{max} = ?$



$t_0 = 2\pi\sqrt{\frac{l}{g}}$

$N = \frac{t}{t_0} = 4{,}32$

$v = \sqrt{gh \cdot 2}$ $\qquad h = l - \cos\varphi \cdot l$



$l' = 2m$

$t_0' = \pi\sqrt{\frac{l}{g}} + \pi\sqrt{\frac{l'}{g}} =$

$= \frac{\pi}{\sqrt{g}}(\sqrt{l} - \sqrt{l'}) = 3{,}15\,s$

$N = \frac{t}{t_0} =$

$\varphi(t) = \varphi_0\cos(\omega t)$ ← krožna frekvenca

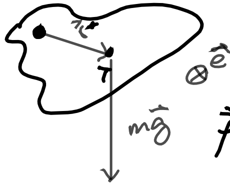
$V_{max} = l \cdot \Omega_{max}$ ← kotna hitrost

$\Omega(t) = \dot\varphi(t) = -\underbrace{\varphi_0\omega}_{\Omega_{max}}\sin(\omega t)$

$V_{max} = l \cdot \varphi_0\omega$

$\cos\varphi \approx 1 - \frac{\varphi^2}{2}$

Težno nihalo



$$\vec{M} = J\vec{\alpha}$$

$$\vec{r}^* \times m\vec{g} = J\vec{\alpha}$$

$$\vec{\varphi} = \varphi \cdot \hat{e}$$

$$r^* m g \sin\varphi \, (-\hat{e}) = J \cdot \ddot{\varphi}\, \hat{e}$$

$$\ddot{\varphi} = -\frac{mgr^*}{J} \sin\varphi$$

$$\varphi \ll 1$$

$$\ddot{\varphi} \approx \underbrace{-\frac{mgr^*}{J}}_{\omega^2} \varphi$$

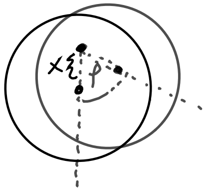
$$t_0 = 2\pi\sqrt{\frac{J}{mgr^*}}$$

Matematično nihalo:

$$J = ml^2$$

$$r^* = l \qquad t_0 = 2\pi\sqrt{\frac{l}{g}}$$

7.7.



$R = 0{,}5\,m$

t_0 min

okoli osnovne osi — translacija

$J = \frac{1}{2} m R^2 + m x^2$

$t_0(x) = ?$

$$t_0 = 2\pi \sqrt{\frac{J}{mgx}} =$$

$$t_0 = 2\pi \sqrt{\frac{\frac{1}{2}R^2 + x^2}{gx}}$$

iščemo max:

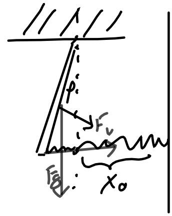
$$\frac{2x(gx) - g\left(\frac{1}{2}R^2 + x^2\right)}{gx^2} = 0$$

$$2gx^2 - gx^2 - \frac{1}{2}R^2 g$$

$$\cancel{g}x^2 = \frac{1}{2}R^2 \cancel{g}$$

$$x = \frac{R}{\sqrt{2}}$$

7.8



$l = 1\,m$

$m = 0,5\,kg$

$k = 5\,N/m$

$\nu = ?$

$\varphi << 1$

$\sum \vec{M} = J \cdot \vec{\alpha}$

racica

$$J\underbrace{\alpha}_{\overset{\shortparallel}{\alpha(t)} = \ddot{\varphi}(t)} = -F_g \cdot \frac{l}{2} \underbrace{\sin\varphi}_{\approx \varphi(t)} - \underbrace{kx}_{F_v} \cdot l \cdot \underbrace{\cos\varphi}_{\approx 1}$$

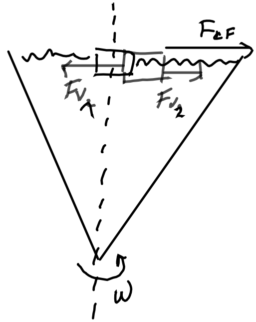
$$x(t) = l \cdot \varphi(t)$$

$$\ddot{\varphi}(t) = -\frac{mg \cdot l}{2J}\varphi(t) - \frac{kl^2}{J}\varphi(t) =$$

$$= -\frac{3g}{2l}\varphi(t) - \frac{3k\,\varphi(t)}{m} = -\Big(\underbrace{\frac{3g}{2l} + \frac{3k}{m}}_{\omega_0}\Big)\varphi(t)$$

$$\omega_0 = \sqrt{\frac{3g}{2l} + \frac{3k}{m}} = 6,7/s$$

$2\pi\nu = \omega_0 \qquad \nu = \frac{\omega_0}{2\pi} = 1,06\,Hz$



$m = 20g$

$k_1 = 1\ N/m$

$k_2 = 3\ N/m$

$\omega = 10/s$

$\nu = ?$

$$\sum F = ma$$

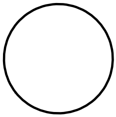
$$ma = -k_1 x - k_2 x + m \overset{\omega^2 x}{\overset{\shortparallel}{a_r}}$$

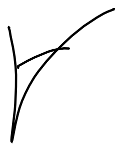
$$\ddot{x}(t) = -\left(\frac{k_1 + k_2 - m\omega^2}{m}\right)x$$

$$\omega_0 = \sqrt{\frac{k_1 + k_2 + m\omega^2}{m}} = 10/s$$

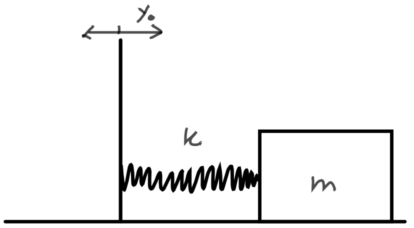
$$\nu = 1{,}6\ Hz$$

Foucaultova nihalo





7.25



$y_0 = 5\,cm$

$m = 100\,g = 0{,}1\,kg$

$k = \frac{N}{m}$

$\beta = 0{,}2/s$

$\nu = 12\,Hz$

$x_0 = ?$

$\delta = ?$

$x_{0max} = ?$

$\nu_{max} = ?$

$$m\ddot{x} = -k(x-y) - 2\beta m\dot{x}$$

$$\ddot{x} + 2\beta\dot{x} + \frac{k}{m}x = \frac{k}{m}y \rightarrow y_0\cos(\omega t)$$

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

Nehomogena diferencialna enačba

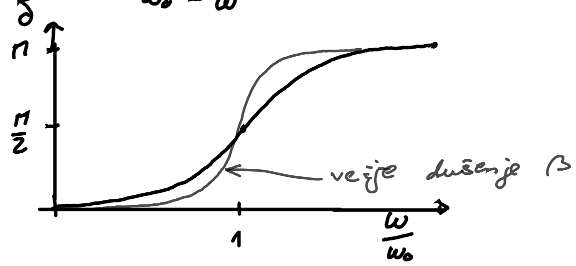
nastavek: $x(t) = X_0 \cdot \cos(\omega t - \delta) + \cancel{x_0' e^{-\beta t} \cos(\omega' t - \delta')}$

$\omega' = \sqrt{\omega^2 - \beta^2}$

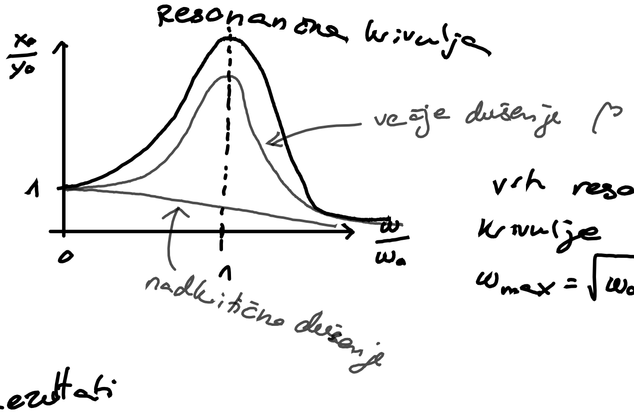
se zaduši, nas pa zanima kaj se ustali

Rezultati:

$$\tan\delta = \frac{2\beta\omega}{\omega_0^2 - \omega^2}$$



$$\frac{x_0}{y_0} = \frac{\omega_0^2}{\sqrt{(\omega_0^2 - \omega^2)^2 + (2\beta\omega)^2}}$$



vrh resonančne krivulje

$\omega_{max} = \sqrt{\omega_0^2 - 2\beta^2}$

Rezultati

$\omega_0 = \sqrt{\frac{k}{m}} = 10/s \Rightarrow \nu = 1{,}6\,Hz$

$\delta = 179{,}7^\circ$

$X_0 = 0{,}89\,mm$

$\nu_{max} \approx 1{,}6\,Hz$

$x_{0max} = 1{,}25\,m$

moč pri vsiljenem nihanju

$$P = \frac{dA}{dt} = \frac{F\,dx}{dt} = Fv = 2\beta m v^2_{(t)} =$$

$$v = \dot{x} = x_0 (-\sin(\omega t) - \delta) \cdot \omega$$

$$\bar{P} = 2\beta m x_0^2 \omega^2 \underbrace{\overline{\sin^2(\omega t - \delta)}}_{= \frac{1}{2}} = \beta m x_0^2 \omega^2$$

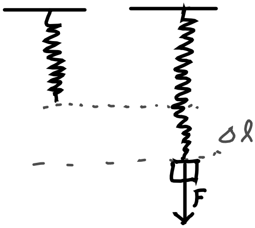
$$\bar{P} \propto \omega^2 \frac{1}{(\omega_0^2 - \omega^2)^2 + (2\beta\omega)^2}$$

$$\frac{dP}{d\omega} = \frac{2\omega\left[(\omega_0^2 - \omega^2)^2 + (2\beta\omega)^2\right] - \left[4\omega(\omega_0^2 - \omega^2) + 8\beta^2\omega\right]}{\left((\omega_0^2 - \omega^2)^2 + (2\beta\omega)^2\right)^2} = 0$$

splosno nihanje

14.3

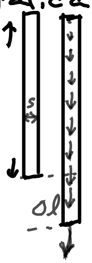
Elastomehanika: Hookov zakon



$F = k \cdot \Delta l$

Vpeljava prožnostnega modula

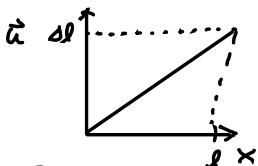
Palica



vektorsko polje

za majhne raztezke

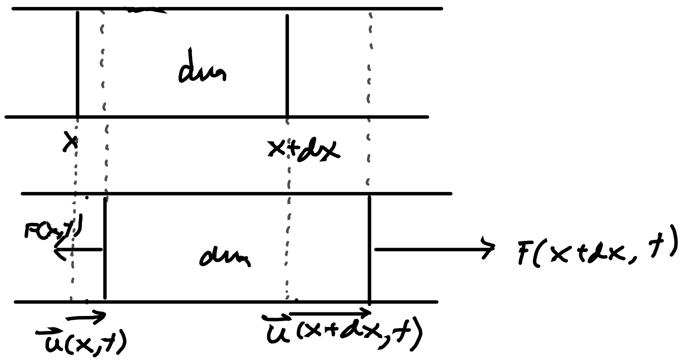
$$\frac{F}{S} = \frac{\Delta l}{l} \cdot E \qquad [E] = \frac{N}{m^2} = Pa$$



$$\frac{du}{dx} = \frac{dl}{l}$$

$$\frac{F}{S} = E \frac{du}{dx}$$

Valovanje v elastični palici



$$F(x+dx,t) - F(x,t) = dm \cdot a\left(x+\frac{dx}{2},t\right)$$

$$SE\frac{du}{dx}(x+dx,t) - SE\frac{du}{dx}(x,t) = dm \cdot \ddot{u}\left(x+\frac{dx}{2},t\right)$$

$$dx \longrightarrow 0$$

$$\cancel{S}E\frac{d^2u}{dx^2}\left(x+\frac{dx}{2},t\right)\cdot\cancel{dx} = \rho\cancel{S}\cancel{dx}\,\ddot{u}\left(x+\frac{dx}{2},t\right)$$

$$\frac{\partial^2 u}{\partial x^2} = \frac{\rho}{E}\frac{\partial u^2}{\partial t^2}$$

$$\downarrow$$

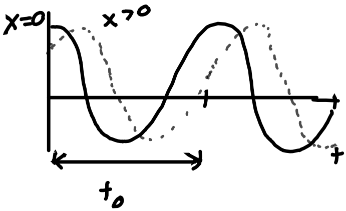
$$\frac{1}{c^2}$$

$$u(x,t) = \overleftarrow{\phi(x+ct)} + \overrightarrow{\psi(x-ct)}$$

$$c = \sqrt{\frac{E}{\rho}}$$

Periodična motnja

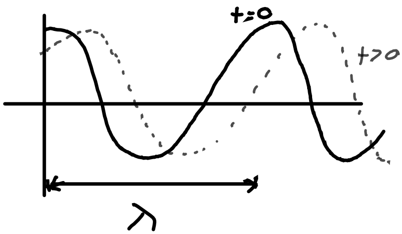
$$u(x,t) = u_0 \cdot \cos(\omega t - kx)$$



Na danem mestu

$$\omega t_0 = 2\pi$$

$$\omega = \frac{2\pi}{t_0} = 2\pi\nu$$



ob danem času

$$c = \frac{\Delta x}{\Delta t} = \frac{\lambda}{t_0} \Rightarrow c = \lambda\nu$$

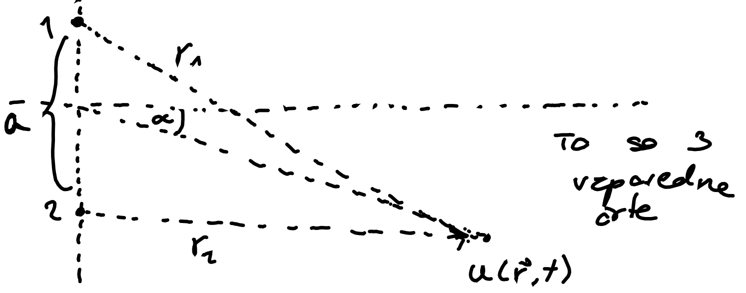
7.49

$a = \frac{3}{10}\lambda$

1. izvor zakasnjen za $\frac{1}{4}$ nihaja $\Rightarrow \delta = \frac{\pi}{2}$

smer i ojačitev = ?

smo daleč od anten



$r_1, r_2 >> a$

$$u = \underbrace{u_0 \sin(\omega t - kr_1 - \delta)}_{\text{prvi izvor}} + \underbrace{u_0 \sin(\omega t - kr_2)}_{2.\text{ izvor}}$$

$$\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$$

$$u = u_0 \sin\left(\frac{2\omega t - k(r_1+r_2) - \delta}{2}\right) \cos\left(\frac{k(r_2-r_1) - \delta}{2}\right)$$

amplituda

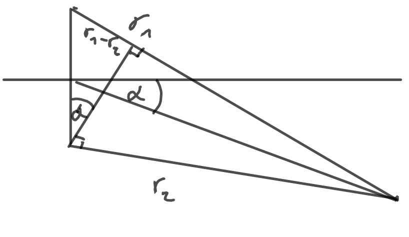
točke za katere je $r_1 - r_2$ konstanta tarej pride hiperbola

$$\frac{k}{2}(r_2 - r_1) - \frac{\delta}{2} = n\pi \quad n \in \mathbb{Z}$$

$j \propto u^2$ mora biti maksimalen (ker iščemo ojačitve)

sorazmerno

odločimo se za neki n in potem gledamo da je tudi na levi strani konstantno



$$r_1 - r_2 = a \sin\alpha$$

$$-\frac{k}{2}(a \sin\alpha) - \frac{\delta}{2} = n\pi$$

$$\sin\alpha = \frac{n\pi + \frac{\delta}{2}}{-\frac{ak}{2}} = \frac{2\pi n + \delta}{-ak}$$

k ..... valovni vektor

$k = \frac{2\pi}{\lambda} \qquad a = \frac{3}{10}\lambda$

$$\sin\alpha = \frac{\lambda(2\pi n + \delta)}{-2\pi a} = \frac{5(2\pi n + \delta)}{-3\pi}$$

$$\sin\alpha = -\frac{10}{3}\left(n + \frac{1}{4}\right)$$

recimo $n = 0$

$$\sin\alpha_0 = -\frac{10}{3} \cdot \frac{1}{4} = -\frac{5}{6}$$

$$\Rightarrow \alpha_0 = -56{,}4$$

$$n = 1 \Rightarrow \sin\alpha_1 = -\frac{10}{3} \cdot \frac{5}{4} = -\frac{25}{6}$$

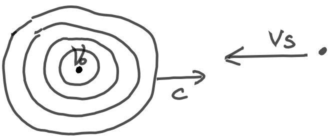
$$\alpha_1 = err$$

$$n = -1 \Rightarrow \sin\alpha_{-1} = -\frac{10}{3} \cdot \left(-\frac{3}{4}\right) = \frac{5}{2}$$

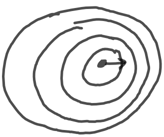
$\nu = 1485\ kH$

$$\lambda = \frac{c}{\nu} = \frac{3 \cdot 10^{8}\,\frac{m}{s}}{1485 \cdot 10^{3}\,{}^{1}\!/_{s}} = 202\,m$$

Dopplerjev pojav



$$N = \frac{ct}{\lambda} + \frac{v_s t}{\lambda} + \frac{vt}{\lambda}$$



$$\lambda = \frac{c}{\nu_0} + \frac{v}{\nu_0} + \frac{v_v}{\nu_0}$$

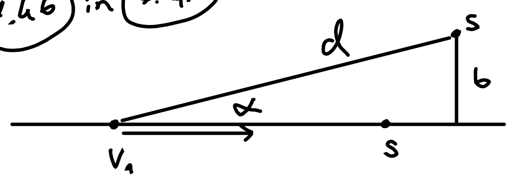
$$\nu_s = \frac{N}{t} = \frac{c+v+v_s}{c+v+v_v} \cdot \nu_0$$

$$= \frac{c + (v+v_s)}{v-(v_0-v)}$$

hitrost sprejemnika glede na veter

hitrost oddajnika glede na veter

(7.46) in (7.47)



$v_1 = 100 \frac{km}{h} = 27{,}8 \frac{m}{s}$

$\nu_0 = 1000$ Hz

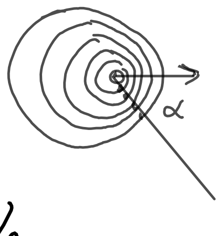
a) $\nu_s = ?$ $\quad \nu_s = \dfrac{c+v_s}{c-v_1}\nu_0$ $\quad v_s = 0 \quad c = 340 \frac{m}{s}$

$v_1 = 27{,}8 \frac{m}{s}$

$\nu_s = 189$ Hz

b) $d = 1000$ m

$b = 500$ m



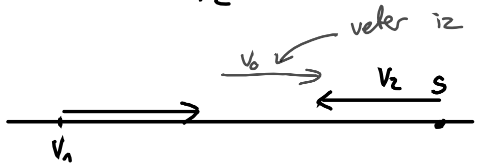
$$\nu_s = \frac{c}{c - v_1 \cos\alpha}\nu_0$$

$$\sin\alpha = \frac{b}{d} = \frac{1}{2} \Longrightarrow \alpha = 30^\circ$$

$$\cos\alpha = \frac{\sqrt{3}}{2}$$

$\nu_s = 1076$ Hz

c)



$v_2 = 80 \frac{km}{h} = 22 \frac{m}{s}$

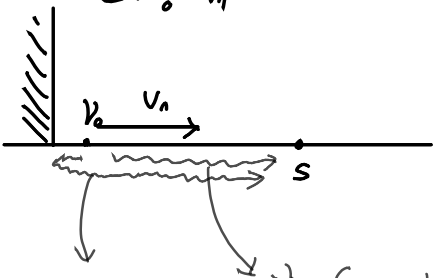
$$\nu_s = \frac{c + v_2}{c - v_1}\nu_0 = 1160 \text{ Hz}$$

d) $v_0 = 30 \frac{km}{h} = 8{,}3 \frac{m}{s}$

veter

$$\nu_s = \frac{c + v_0 + v_2}{c + v_0 - v_1} = 1156 \text{ Hz}$$

e)

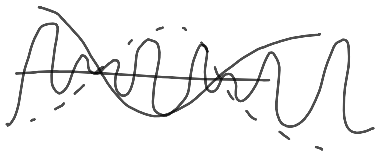


$$\nu_{s_1} = \frac{c}{c + v_1}\nu_0 \qquad \nu_{s_2} = \frac{c}{c - v_1}\nu_0$$

$$\nu_s = \nu_{s_1} + \nu_{s_2} = c\nu_0\left(\frac{1}{c+v_1} + \frac{1}{c-v_1}\right) =$$

$$= c\nu_0\left(\frac{c - v_1 + c + v_1}{c^2 - v_1^2}\right) = c\nu_0\left(\frac{2c}{c^2 - v_1^2}\right)$$

$$\cos(\omega' t) + \cos(\omega'' t) = 2\cos\left(\frac{\omega' + \omega''}{2}t\right)\cos\left(\frac{\omega' - \omega''}{2}t\right)$$



slišimo utripanje

15.4.

$\forall$ zamudila 20 minut

(naloga 10.13)

$$\int_V \operatorname{div}\vec{D}\,dV = \int_{\partial V} \vec{D}\,\vec{n}\,dS \qquad \vec{D} = \varepsilon_0 \vec{E}$$

$$\int \rho_e\,dV = \varepsilon_0 \oint \vec{E}\cdot d\vec{S}$$

$$e = \varepsilon_0 \oint \vec{E}\,d\vec{S}$$

← Naloga

$$\vec{E}_\perp = \frac{\lambda}{2\pi\varepsilon_0\rho}$$

$$e = \varepsilon_0 \oint_S \vec{E}\,\vec{n}\,dS$$

plašč, vrh in dno valja

$$\lambda\cdot l = \varepsilon_0 \oint E_\perp dS + 0 + 0$$

$$\lambda\cdot \cancel{l} = \varepsilon E_\perp \oint dS = \varepsilon = \varepsilon E_\perp 2\pi\rho\cdot\cancel{l}$$

$$E_\perp = \frac{\lambda}{\varepsilon_0 2\pi\rho}$$

$$W_k + W_{el} = \text{konst}$$

$$\frac{mv_0^2}{2} + W_{pe}(a) = \frac{mv_a^2}{2} + W_{pe}(b)$$

$$\frac{m}{2}(v_a^2 - v_b^2) = W_{pe}(b) - W_{pe}(a)$$

$$\int_a^b \underset{\substack{\parallel \\ -E_\perp e}}{F}\,d\rho = -\int_a^b e\frac{\lambda}{2\pi\varepsilon_0\rho}\,d\rho = -\frac{\lambda e}{2\pi\varepsilon_0}\ln\frac{b}{a} = \frac{\lambda e}{2\pi\varepsilon_0}\ln\frac{a}{b}$$

$$= \frac{m}{2}\sin^2\varphi\cdot v_a^2$$

$$\vec{v}_{a\parallel} = \vec{v}_b$$

kot pri pašavnem metu

$$\ln\frac{a}{b} = \frac{\pi\varepsilon_0 m\sin^2\varphi}{\lambda e}$$

$$b = 16.8\ \mu m$$

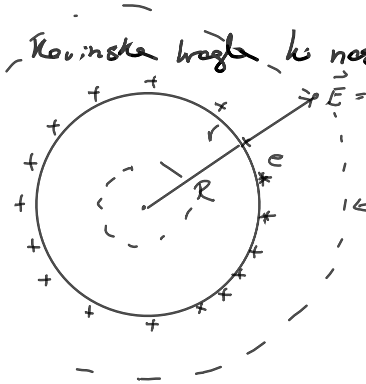
$$W_{ep}(\vec{r}_2) - W_p(\vec{r}_1) = -e \int_{\vec{r}_1}^{\vec{r}_2} \vec{E}\, d\vec{r} \qquad / :e$$

$$\Phi(\vec{r}_2) - \phi(\vec{r}_1) = \int_{r_1}^{r_2} \vec{E}\, d\vec{r}$$

10.18

10.20

Kovinska krogla ki nosi naboj e



$r > R$

$$e = \varepsilon_0 \int_S \vec{E}\, d\vec{S}$$

$\vec{E}$ je konstanta

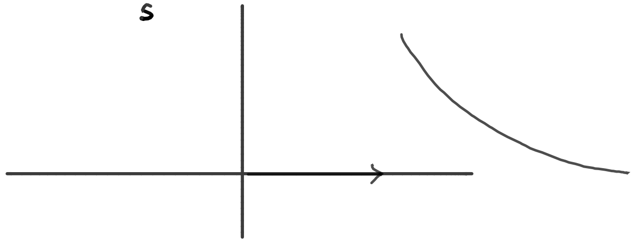
$$e = \varepsilon_0 E\, 4\pi r^2$$

$$\Rightarrow E = \frac{e}{\varepsilon_0 4\pi r^2}$$

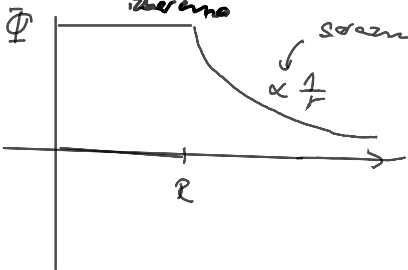
$r < R$

0 ker nima znotraj nič naboja

$$e = \varepsilon_0 \int_S E\, dS \Rightarrow E = 0$$



$$\Phi(r) = \underbrace{\Phi(\infty)}_{\text{izberemo}} - \int_\infty^{\vec{r}} \vec{E}\, d\vec{r} = -\int_\infty^{r} \frac{e}{\varepsilon_0 4\pi r^2} dr = \frac{e}{\varepsilon 4\pi}\left(\frac{1}{r} - 0\right) = \frac{e}{\varepsilon_0 4\pi r}$$



$$\Phi(r < R) = \Phi(R) = \frac{e}{\varepsilon_0 4\pi R}$$

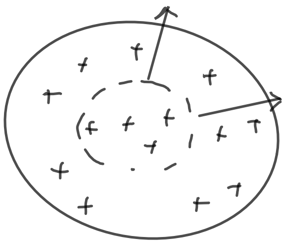
Enakomerno nabita krogla

$r > R \Rightarrow$ isto kot prej

$$E = \frac{e}{\varepsilon_0 4\pi r^2}$$

$$\phi(r) = \frac{e}{\varepsilon_0 4\pi r}$$

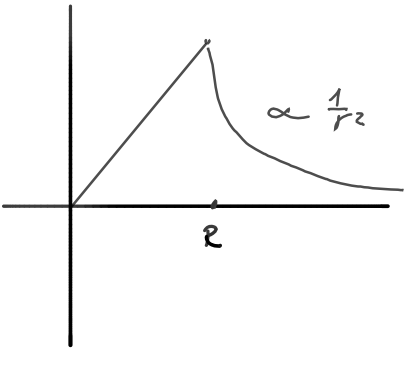
$r < R \Rightarrow$



$$e = \varepsilon_0 \oint_S E \, dS$$

$$e' = \varepsilon_0 E 4\pi r^2 \qquad e' = \frac{3e}{4\pi R^3} \cdot \frac{4\pi r^2}{3} = e\frac{r^3}{R^3}$$

$$E = \frac{e r^3}{R^3 \varepsilon_0 4\pi r^2} = \frac{e r}{R^3 \varepsilon_0 4\pi}$$



$$\Phi(r) = \Phi(R) - \int_R^r \frac{e r}{\varepsilon_0 4\pi R^3} dr =$$

$$\Phi(R) - \frac{e r^2}{\varepsilon_0 8\pi R^3} \Big|_R = \Phi(R) - \frac{e r^2}{\varepsilon_0 8\pi R^3} + \frac{e}{\varepsilon_0 8\pi R} =$$

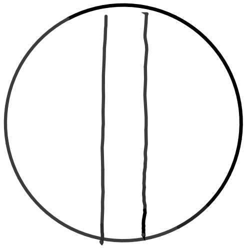
$$= \frac{e}{4\pi \varepsilon_0}\left(\frac{1}{R} - \frac{r^2}{2R^3} + \frac{R^2}{2R^3}\right) = \frac{e}{4\pi R \varepsilon_0}\left(\frac{3}{2} - \frac{r^2}{2R^2}\right)$$

$$\vec{E} = \frac{e}{\varepsilon_0 4\pi r^3} \vec{r}$$

$\forall$ zamude

$$e_1 \cdot E(\vec{r}) = -e_1 \frac{e\vec{r}}{4\pi\varepsilon_0 R^3} =$$

b)



$M = 6 \cdot 10^{24}$ kg

$R = 6400$ km

$$F_e = \frac{e_1 e_2}{4\pi\varepsilon_0 r^2} \qquad F_g = G\frac{m_1 m_2}{r^2}$$

$e_1 \leftrightarrow m$:

$$\frac{1}{4\pi\varepsilon_0} \longrightarrow G$$

lahko zamenjamo ko razlogi

$$\cancel{m}a = F_g = -\cancel{m}G\frac{Mr}{R^3}$$

$$\ddot{r} + \underbrace{G\frac{M}{R^3}}_{\omega^2} r = 0$$

$$\nu = \frac{\sqrt{G\frac{M}{R^3}}}{2\pi} \Longrightarrow t_0 = \frac{1}{\nu} = \frac{2\pi}{\sqrt{G\frac{M}{R^3}}} = 84{,}7\,\text{min}$$

10.27

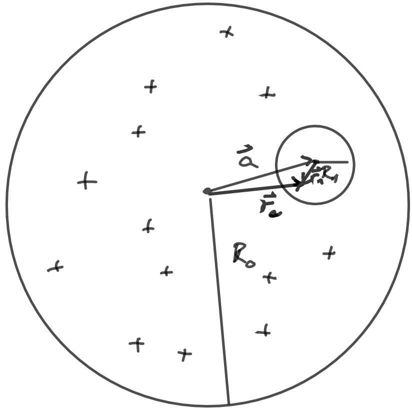
$R_0 = 10\,m$

$\rho_e = 2\ \mu As/m^3$

$R_1 = 2\,m$

$a = 7\,m$

$E = ?$ v votlini



$\rho_1 = -\rho_e$

$$\underbrace{\vec{E}_s}_{\text{celotna velika krogla}} = \vec{E}_0 + \underbrace{\vec{E}_1}_{\text{mejhna krogla}}$$

$$\frac{e\,\vec{r}_0}{4\pi\varepsilon_0 R_0^3} + \frac{e_1\vec{r}_1}{4\pi\varepsilon_0 R_1^3} =$$

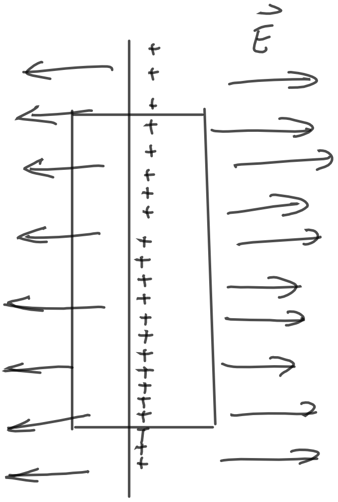
$$= \frac{\rho_e \frac{\cancel{4\pi R_0^3}}{3}\vec{r}_0}{\cancel{4\pi}\varepsilon_0 \cancel{R_0^3}} - \frac{\rho_e \cdot \frac{\cancel{4\pi R_1^3}}{3}\vec{r}_1}{\cancel{4\pi}\varepsilon_0 \cancel{R_1^3}} =$$

$$= \frac{\rho_e\,(\vec{r}_0 - \vec{r}_1)}{3\,\varepsilon_0} = \frac{\rho_e}{3\varepsilon_0}\vec{a}$$

$$|\vec{E}_s| = \frac{2\,10^{-6} As \cdot 7\,m}{m^3 \cdot 3 \cdot 8.85 \cdot 10^{-12} As}$$

10.18 → 10.30

enakomerno
nabite
plošče

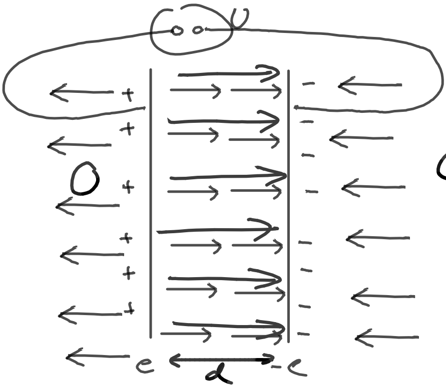


$$e = \varepsilon_0 \oint_{S\ (\partial K)} \vec{E}\cdot\vec{n}\cdot dS = \varepsilon_0 \oint_S E \cdot dS = \varepsilon_0 E \oint_S dS =$$

vzporedno   konstantno

$$= 2\varepsilon_0 E\, P(\text{ploskev}) + 0$$

$$E = \frac{e}{2\varepsilon_0 S} = \frac{\sigma}{2\varepsilon_0}$$



$$E = \frac{\cancel{2}\sigma}{\varepsilon_0}$$

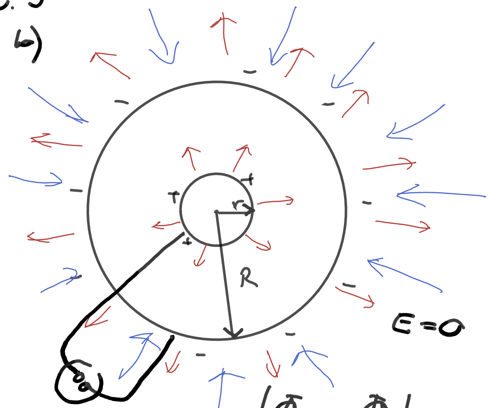
$$\Delta\Phi = -\int \vec{E}\, d\vec{r} = U = E\, d = \frac{\sigma}{\varepsilon_0} d = \frac{ed}{S\varepsilon_0}$$

$$e = \frac{U S \varepsilon_0}{d} = U \cdot C$$

$$C = \frac{e}{U} \qquad [\,F = \frac{As}{V}$$

10.30

b)



$$|\Phi_R - \Phi_r|$$

$$|\Delta\Phi| = U = \left| \frac{e}{4\pi\varepsilon_0 R} - \frac{e}{4\pi\varepsilon_0 r} \right| = \left| \frac{e(r-R)}{4\pi\varepsilon_0 R r} \right| =$$

$$= \frac{e\,(R-r)}{4\pi\varepsilon_0 R r}$$

$$\boxed{C = \frac{e}{U} = \frac{4\pi\varepsilon_0 R r}{(R-r)}}$$

10.4.

Na tabl.: