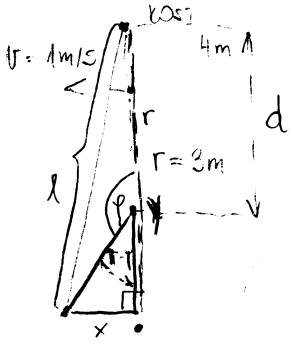
6.2.07 VAJE $d = 4m$

$(\sin(x))^2 = \sin^2 x$

STR. 16 / NAL. 1.)



$l(12\,s) = ?$

perioda

$t_{min} = 0$; $t_{min} = n \cdot T_0$

$\omega = \frac{v}{r}$

$T_0 = \frac{2\pi r}{v} = \frac{2\pi}{\omega} = \frac{2\pi \cdot 3m}{1\,\frac{m}{s}} = 18{,}8\,s$

$t_{max} = n + \frac{T_0}{2} = 1n + 9{,}45\,s$

$l^2 = x^2 + y^2 = (r \cdot \sin(\pi - \varphi))^2 + (d + r \cdot \cos(\pi - \varphi))^2$

$l^2 = r^2 \cdot \sin^2(\pi - \varphi) + d^2 + r^2 \cdot \cos^2(\pi - \varphi) + 2dr\cos(\pi - \varphi)$

$l^2 = r^2 + d^2 + 2dr\cos(\pi - \varphi) \Rightarrow r^2 + d^2 + 2dr\cos(\pi - 4)$

$(\varphi = v \cdot t)$

$\varphi = \omega \cdot t = \left(\frac{v}{r} \cdot t\right)$

$\varphi = \frac{1m/s \cdot 12s}{3m}\,rd = 4\,rd$

$l^2 = 9m^2 + 16m^2 + 2 \cdot 3 \cdot 4m^2 \cdot 0{,}653$

$l = 6{,}38m$

STR. 17 / NAL. 4

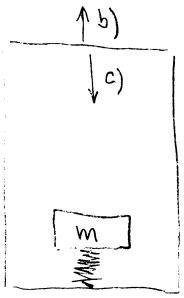
$m = 70kg$

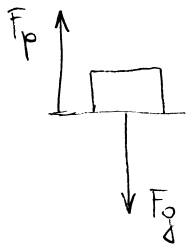
a) $a = 0$

b) $a = 3m/s^2$

d) $a = 2m/s^2$

c) $a = 0$





a) $\sum F = m \cdot a = 0$

$F_p = -F_g \Rightarrow m_{a)} = 70kg$

b) $\sum F = F_p + F_g = m \cdot a$

$F_p = ?$

$F_p = m \cdot a - F_g = ma - m \cdot g = m(a - g)$

$F_p = 70kg\,(3m/s^2 + 10\,m/s^2) = 910N$

$m = 910N/g = 91\,kg$

d) $\sum F = m \cdot a + F_g$

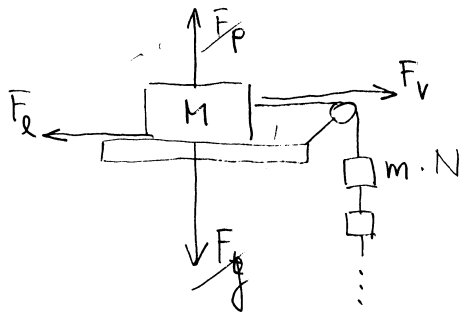
$F_p = 70kg\,(2m/s^2 - 10\,m/s^2)$

$F_p = 560N$

$m = 560N/g = 56kg$

c) $m = 70kg$

STR. 47 / NAL. 6 (8)



SISTEM

$M = 2{,}2\ kg$

$k_L = 0{,}3$

$m = 0{,}2\ kg$

$N = 8$

$a = ?$

$k_t = 0{,}28$

$\vec{F}_g + \vec{F}_p = \emptyset$

$F_p = F_g$

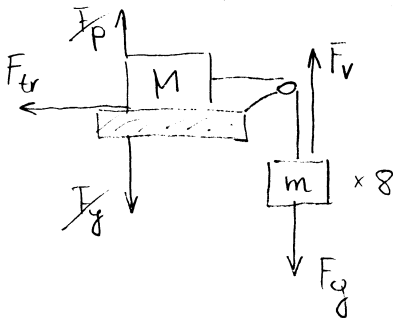
$$F_{l_{max}} = k_l \cdot F_p$$

$$F_l = 0{,}3 \cdot 2{,}2\ kg \cdot 10\ m/s^2 = 6{,}6\ N$$

$$F_v = F_l$$

$$g \cdot (m \cdot N) = F_l$$

$$N = \frac{F_l}{g \cdot m} = \frac{6{,}6\ N \cdot s^2}{10\ m \cdot 0{,}2\ kg} = 3{,}3 \Rightarrow \boxed{N = 4}$$



$m = 1{,}6\ kg$

$$F_{tr} = k_t \cdot F_p = k_t \cdot M \cdot g$$

x → ↑ y

SISTEM 1: $F_v - F_{tr} = M \cdot a$

x smer

SISTEM 2: $F_v - F_g = -m \cdot a$

$F_v = -m \cdot a + F_{gm}$

$F_v = -(m \cdot a) + m \cdot g$

$-(m \cdot a) + m \cdot g - F_{tr} = M \cdot a$

$-am + m \cdot g - (k_t \cdot M \cdot g) = M \cdot a$

$mg - k_t M g = Ma + am$

$a(M + m) = mg - k_t M \cdot g$

$$a = \frac{mg - k_t \cdot M \cdot g}{M + m} = \frac{g(m - k_t M)}{M + m} = 2{,}6\ m/s^2$$

$$\Downarrow$$

$$a = \frac{F_{g_2} - F_t}{(M + m)}$$

Str. 18 / NAL. 1 Enakomerno pospešeno gibanje!

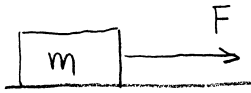
$M = 5t = 5000kg$

$F_1 = 2000N$

$t_1 = 2s$

$F_2 = 1000N$

$t_2 = 2s$



$s_1 = a_1 \cdot \frac{t_1^2}{2}$

$s_2 = v_1 \cdot t_2 + a_2 \cdot \frac{t_2^2}{2}$

$A = F \cdot s = A_1 + A_2$

$A_1 = F_1 \cdot s_1 \; ; \; A_2 = F_2 \cdot s_2$

$a_1 = \frac{F_1}{M}$

$a_2 = \frac{F_2}{M}$

$v_1 = a_1 \cdot t_1$

$\sum A = ?$

$A = A_1 + A_2$

$A_1 = F_1 \cdot \frac{F_1}{M} \cdot \frac{t_1^2}{2}$

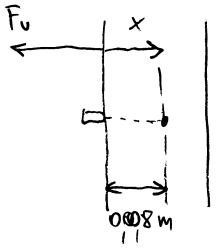
$A_2 = F_2 \cdot a_1 \cdot t_1 \cdot t_2 + \frac{F_2}{M} \cdot \frac{t_2^2}{2} \cdot F_2$

$A = \frac{F_1^2}{2M} \cdot t^2 + F_2 \cdot \frac{F_1}{M} t^2 + \frac{F_2^2 \cdot t^2}{2M}$

$A = \frac{1 t^2}{2M} \left(F_1^2 + 2F_1F_2 + F_2^2 \right) = 3600J$

$P = \frac{A}{t} = \frac{3600J}{4s} = 900W$

STR. 18 / NAL. 2



$m = 30g$

$v = 400m/s$

$x = 8cm$

$F_u = ?$

upora

$\Delta W_k = A$

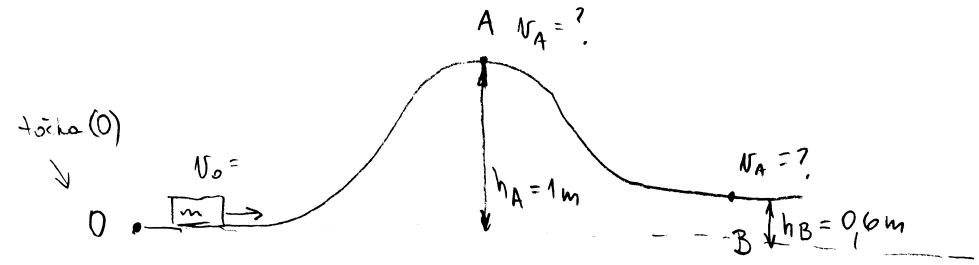
$W_{k_2} = \emptyset$

$W_{k_2} - W_{k_1} = A$

$- \frac{1}{2} m \cdot v^2 = -F_u \cdot s$

$F_u = \frac{m \cdot v^2}{2 \cdot s} = \frac{0{,}03kg \cdot 400^2 m^2}{s^2 \cdot 2 \cdot 0{,}08m} = 30kN$

STR. 19/NAL. 8 (10)



$v_0 = 5\,m/s$

$v_A = ?$

$v_B = ?$

$h_{max} = ?$

$\Delta W = \emptyset$

$\Delta W_k + \Delta W_p = \emptyset$

na začetku

$0 \to A \Rightarrow W_{k_A} - W_{k_0} + W_{p_A} - W_{p_0} = \emptyset$

$\frac{1}{2} m v_A^2 - \frac{1}{2} m \cdot v_0^2 + m \cdot g \cdot h_A = \emptyset$

$\frac{v_A^2}{2} - \frac{v_0^2}{2} = -g \cdot h_A \,/\cdot 2$

$v_A^2 = -2gh_A + v_0^2 \Rightarrow v_A = 2{,}32\,m/s$

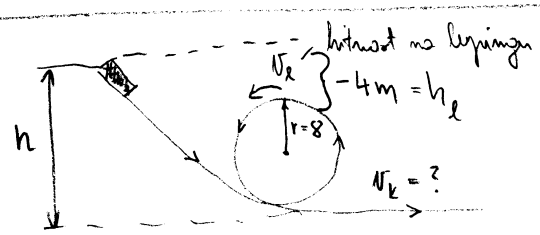
$v_B^2 = -2gh_B + v_0^2 \Rightarrow v_B = 3{,}64\,m/s$

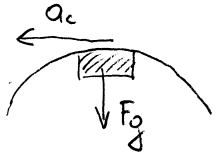
$v_A^2 = v_0^2 - 2gh_A$

$0 = v_0^2 - 2gh_{max}$

$h_{max} = \frac{v_0^2}{2g} = 1{,}28\,m$

STR. 20/NAL. 11





$r = 8\,m$

$h_{min} = ?$

$m = 2\,t$

$v_z = 10\,m$

$F = ?$

$h = -h_l + 2r$

$h = +4 + 16 = 20\,m$

$a_c = g$

$\frac{v_l^2}{r} = g$

$v_l = 8{,}95\,m/s$

$v_l^2 = v_0^2 - 2gh_l$

vrhinja

$-h_l = \frac{v_l^2}{-2g} = -4\,m$

$v_k = \sqrt{-2 \cdot g \cdot h} = \sqrt{-2 \cdot 10(-20)} = 20\,m/s$

$\rightarrow v_k = 20\,m/s$

$\Delta W_k = -F \cdot s$

$+\frac{m \cdot v_k^2}{2} = -F \cdot s$

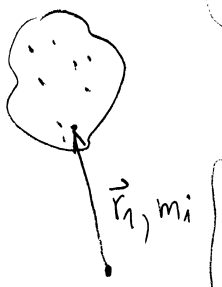
$F = \frac{m \cdot v_k^2}{2 \cdot s} = 40\,kN$

$a = \frac{v}{t} = \frac{v}{s/(v/2)} = \frac{v^2}{2s} = 20\,m/s^2 = -20$

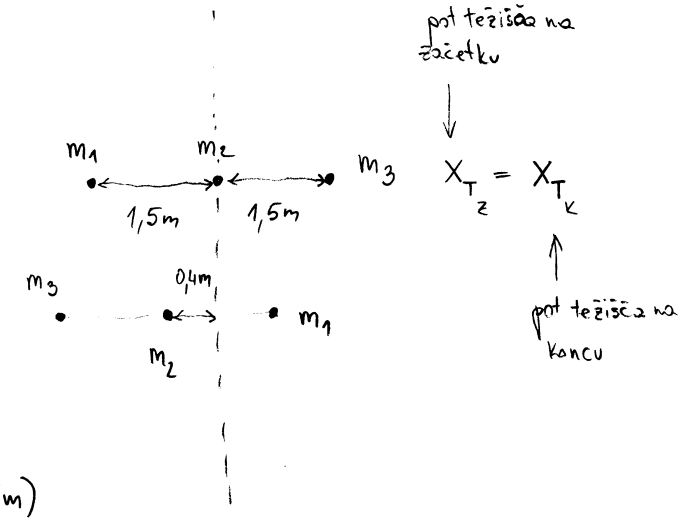
str. 21 / NAL. 3

$\vec{r}_T = \frac{\sum_i m_i \cdot \vec{r}_i}{\sum m_i}$ (težišče)

$m_i \cdot \vec{a} = \sum \vec{F}_i \Rightarrow \sum m \cdot \vec{a}_T = \sum \vec{F}_{zun} = \emptyset$



splošno



$m_1 = 80\,kg$

$m_2 = 30\,kg \Rightarrow F_2 = 300\,N$

$m_3 = ?$

$$\vec{X}_{T_z} = \frac{m_1(-1{,}5m) + m_2 \cdot 0 + m_3(1{,}5m)}{m_1 + m_2 + m_3}$$

$$\vec{X}_{T_k} = \frac{m_3(-1{,}9m) + m_2 \cdot 0{,}4m + m_3(1{,}1m)}{m_1 + m_2 + m_3}$$

$$m_1(-1{,}5m) + m_3(1{,}5m) = m_3(-1{,}9m) + m_2 \cdot 0{,}4m + m_3(1{,}1m)$$

$$-1{,}9m_3 + 1{,}1m_3 - 1{,}5m_3 = -1{,}5m_1 - 0{,}4m_2$$

$$m_3(-1{,}5m) = -1{,}5m_1 - 0{,}4m_2$$

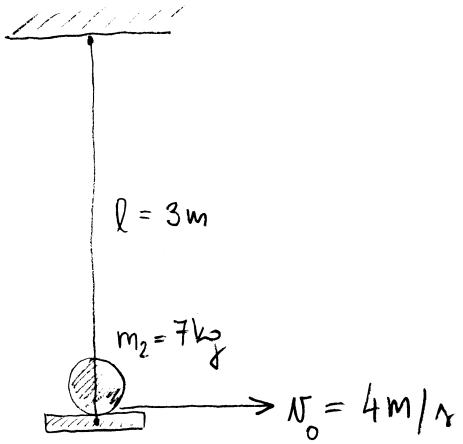
$$m_3 = 57{,}6\,kg$$

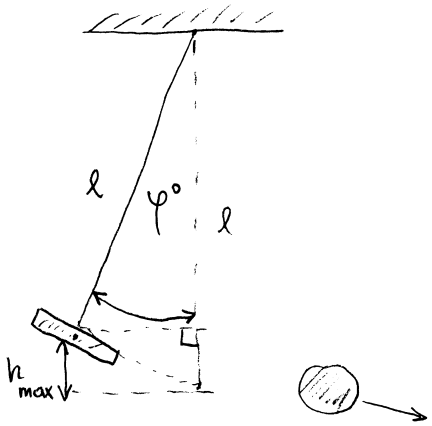
STR. 22 / NAL. 3 (12)

GIBALNA KOLIČINA

$m_1 = 5\,kg$

$m_2 = 7\,kg$





$m_1 = 5kg$

$P_z = \emptyset$

$\emptyset$, ko je gugalnica max. odmaknjena

$\varphi = max$

$v_k^2 = v_0^2 - 2gh$

gibalna količina

$\vec{P} = m \cdot \vec{v}$

$\Delta\vec{P} = \vec{F}_z \cdot \Delta t$

$\Delta\vec{P} = \emptyset$

začetek: $P = \emptyset$

MAČKA GUGALNICA

KONEC: $P_M + P_G = \emptyset$

$m_2 \cdot v_0 + m_1 \cdot v_1 = \emptyset$

$v_1 = -\frac{m_2}{m_1} \cdot v_0 = -5{,}6\,m/s$

$h_{max} = \frac{v_1^2}{2g} = 1{,}57\,m$

$l = h_{max} + l \cdot \cos\varphi$

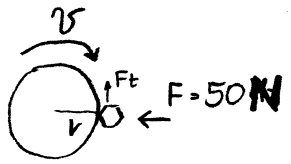
$\cos\varphi = \frac{l - h_{max}}{l} = 1 - \frac{h_{max}}{l} = 0{,}477$

$\varphi = 61°$

13.2.07

str 13/4

$\nu = 15\,Hz$



$P = ?$

$k_t = 0{,}38$

$A = \vec{F} \cdot \vec{s} = -\vec{F}_t \cdot \vec{s}$

$F_t = k_t \cdot F_p = 0{,}38 \cdot 50N = 19N$

$A = -F_t \cdot s \,/ : t$

$P = \frac{-F_t \cdot s}{t} = -F_t \cdot v = 19N \cdot 14{,}1 m/s = -268W$

negativno, ker je oddano delo

$\omega = 2 \cdot \pi \cdot \nu = 30 \cdot \pi s^{-1}$

$v = \omega \cdot r = 3\pi s^{-1} \cdot 0{,}15 = 14{,}1 m/s$

---

str 22/5

$m_1 = 80kg$

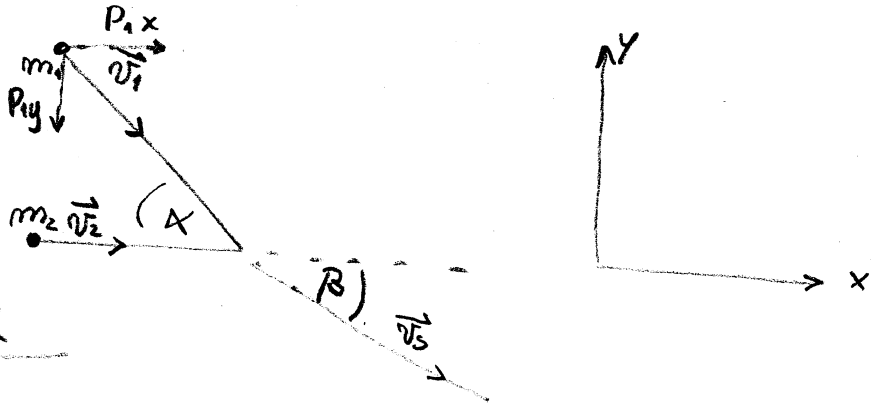
$m_2 = 50kg$

$|v_1| = |v_2| = 1{,}5 m/s$

$\sphericalangle(v_1, v_2) = 60° = \alpha$

$|v_s| = ?$

$\sphericalangle(v_s, v_2) = ? = \beta$



$\vec{P}_1 = m_1 \cdot \vec{v}_1$

$\vec{P}_2 = m_2 \cdot \vec{v}_2$

$\vec{P}_s = (m_1 + m_2) \cdot \vec{v}_s$

$\Delta\vec{P} = \int \vec{F}_z \cdot dt$

$F_z = 0 \Rightarrow \boxed{\Delta\vec{P} = 0}$

$\vec{P}_z = \vec{P}_k$

$\vec{P}_1 + \vec{P}_2 = \vec{P}_s$

$x: P_1 = m_1 \cdot v_1 \cdot \cos\alpha + m_2 \cdot v_2$

$= (m_1 \cdot m_2) \cdot \cos\beta \cdot v_s$

$y: P_2 = -m_1 \cdot v_1 \cdot \sin\alpha + 0 = (m_1 + m_2) \cdot \sin\beta \cdot v_s$

$\frac{y}{x}: \frac{m_1 \cdot v_1 \cdot \sin\alpha}{m_1 \cdot v_1 \cdot \cos\alpha + m_2 \cdot v_2} = \frac{\sin\beta}{\cos\beta} = tg\beta$

$tg\beta = 0{,}93 \Rightarrow \beta = 37{,}6°$

$v_s = \frac{m_1 \cdot v_1 \cdot \sin\alpha}{(m_1 + m_2) \cdot \sin\beta} = 1{,}3 m/s$

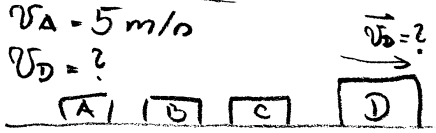
str 22/6 (14)

$m_A = m_B = m_C = 2\,kg$

$m_D = 3\,kg$

$v_A = 5\,m/s$

$v_D = ?$



a) nieprężni trki

b) prężni trki

b) prężni trk

$\vec{P_z} = \vec{P_k}$

$W_{kz} = W_{kk}$

$m_1 \cdot v_A = m_1 \cdot v_A' + m_1 \cdot v_B =$

$m_1 \cdot \frac{v_A^2}{2} = \frac{m_1}{2} \cdot \frac{v_A'^2}{2} + m_1 \cdot \frac{v_B^2}{2}$

$v_A = v_A' + v_B$

$v_A^2 = v_A'^2 + v_B^2 \Rightarrow \underline{v_A' = 0}$

$\underline{v_C = v_A}$

$m_1 \cdot v_A = m_1 \cdot \frac{m_1 - m_2}{2m_1} \cdot v_D + m_2 \cdot v_D$

$m_1 \cdot v_A = v_D \left(\frac{m_1 - m_2}{2} + m_2 \right)$

$m_1 \cdot v_A = v_D \left(\frac{m_1 - m_2 + 2m_2}{2} \right)$

$m_1 \cdot v_A = v_D \frac{m_1 + m_2}{2}$

$v_D = \frac{2 \cdot m_1 \cdot v_A}{m_1 + m_2}$

$v_D =$

v_D nie v_A

$m_1 \cdot v_A = m_1 \cdot v_A' + m_2 \cdot v_D$

$m_1 \cdot \frac{v_A^2}{2} = m_1 \cdot \frac{v_A'^2}{2} + m_2 \cdot \frac{v_D^2}{2}$

$(m_1 \cdot v_A)^2 = m_1^2 \cdot v_A'^2 + m_2^2 \cdot v_D^2 + 2 m_1 \cdot m_2 \cdot v_A' \cdot v_D$

$m_1^2 \cdot v_A^2 = m_1^2 \cdot v_A'^2 + m_2 \cdot v_D^2 \cdot m_1 \; / \cdot m_1$

$0 = 0 + m_2^2 \cdot v_D^2 + 2 m_1 \cdot m_2 \cdot v_A' \cdot v_D - m_1 \cdot m_2 \cdot v_D^2$

$0 = v_D \left(m_2^2 \cdot v_D + 2 m_1 \cdot m_2 \cdot v_A' - m_1^2 \cdot m_2 \cdot v_D \right)$

$m_2^2 \cdot v_D + 2 m_1 \cdot m_2 \cdot v_A' - m_1 \cdot m_2 \cdot v_D = 0 \; / : m_2$

$v_A' \cdot 2 m_1 = v_D \cdot m_1 - m_2 \cdot v_D$

$v_A' \cdot 2m = v_D (m_1 - m_2)$

$v_A' = \frac{m_1 - m_2}{2 m_1} \cdot \underline{v_D = 4\,m/s}$

a) nieprężni trk:

$\vec{P_z} = \vec{P_k}$

$m_1 \cdot v_A = (3m_1 + m_4) \cdot v_S$

$v_S = \frac{m_1 \cdot v_A}{(3m_1 + m_4)} = \underline{1{,}1\,m/s}$

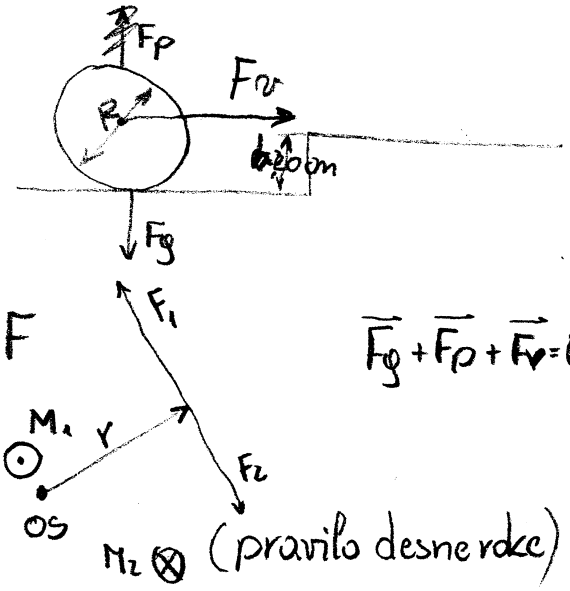
Navor in vztilna količina

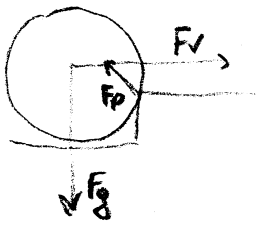
c' - 23/1

$m = 10\,kg$

$R = 1\,m \Rightarrow r = 0{,}5\,m$

$h = 0{,}2\,m$





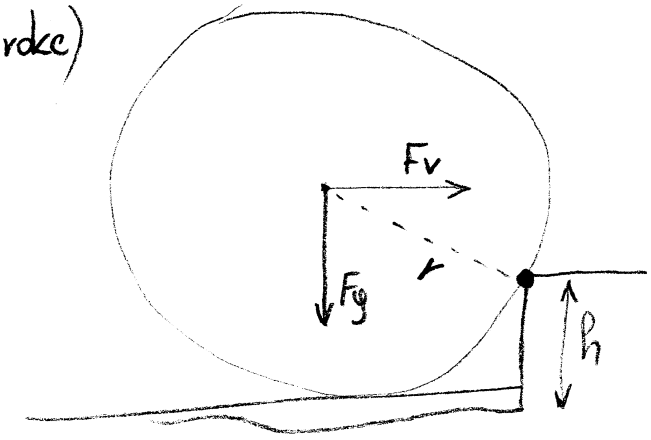
$\vec{M} = \vec{r} \cdot F$

$\vec{F_g} + \vec{F_p} + \vec{F_v} = 0$

$M_z \otimes$ (pravilo desne roke)

$M = r \cdot F \cdot \sin\varphi$

$M = r_1 \cdot F$



$\sum M_z = 0$

$M_g + M_v = 0$

$M_g = F_g \cdot r_g = m \cdot g \cdot r \cdot \cos\alpha$

$M_v = -F_v \cdot r_v = -F_v \cdot r \cdot \sin\alpha$

$\Big\} = 0$

$m \cdot g \cdot r \cdot \cos\alpha = F_v \cdot r \cdot \sin\alpha \;/ : \sin\alpha$

$m \cdot g \cdot \frac{\cos\alpha}{\sin\alpha} = F_v$

$\sin\alpha = \frac{0{,}3}{0{,}5} = 0{,}6 \Rightarrow \alpha = 36{,}8°$

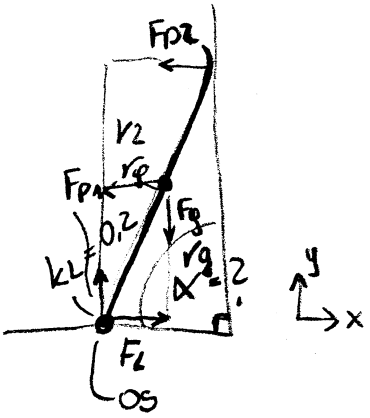
$F_v = \frac{m \cdot g}{tg\,\alpha} = \frac{100\,N}{tg\,36{,}8°} = \underline{133\,N}$

Obr 23/2 (16)

$\Sigma F = 0$

$k_L = 0{,}2$

y: $F_{p1} = F_g$ x: $F_{p2} = F_L$



$M_{p2} = M_g$ ~~$M_{p2} = M_g$~~

$$\left.\begin{aligned} M_{p2} &= r_2 \cdot F_{p2} = l \cdot \sin\alpha \cdot F_{p2} \\ M_g &= r_g \cdot F_g = \frac{l}{2} \cdot \cos\alpha \cdot F_g \end{aligned}\right\} = 0$$

~~$l \cdot \sin\alpha \cdot F_{p2} = \frac{l}{2} \cdot \cos\alpha \cdot F_g$~~

$l \cdot \sin\alpha \cdot F_{p2} = \frac{l}{2} \cdot \cos\alpha \cdot F_g \;/ : l$

$\sin\alpha \cdot F_{p2} = \frac{1}{2} \cdot \cos\alpha \cdot F_g$

$F_{p2} = \frac{\cos\alpha \cdot F_g}{2 \sin\alpha}$

$F_{p2} = \frac{F_g}{2 \operatorname{tg}\alpha}$

$F_{p2} = F_L = F_{p1} \cdot k_L = F_g$

$F_{p2} = F_L = F_{p1} \cdot k_L$

$\frac{F_g}{2 \operatorname{tg}\alpha} = F_g \cdot k_L$

$\operatorname{tg}\alpha = \frac{F_g \, l \, 1}{2 k l}$

$\operatorname{tg}\alpha = 2{,}5 \Rightarrow \alpha = 68{,}2°$

str 24/6

$m_1 = 100\,kg$

$r_1 = 20\,cm = 0{,}2\,m$

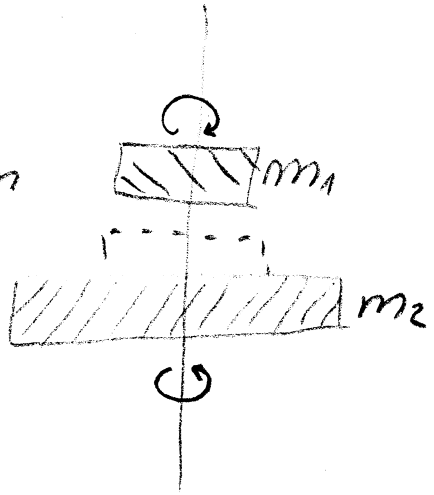
$\nu = 2\,s^{-1} = 2\,Hz$

$m_2 = 200\,kg$

$r_2 = 0{,}3\,m$

$\nu_2 = 1\,Hz$

$\nu_3 = ?$



$$\Gamma = \sum_i m_i \cdot \vec{r}_i \times \vec{v}_i$$

$$\Gamma = J \cdot \omega \quad (\vec{p} = m \cdot \vec{v})$$

$$J = \frac{1}{2} m \cdot r^2$$

$$\Delta\Gamma = \int \vec{M} \cdot dt = \vec{M} \cdot \Delta t = 0$$

$$\Gamma_z = \Gamma_k$$

$$\Gamma_z = \Gamma_1 + \Gamma_2 = J_1 \cdot \omega_1 - J_2 \cdot \omega_2$$

$$\Gamma_k = (J_1 + J_2) \cdot \omega_3$$

$$J_1 \cdot \omega_1 - J_2 \cdot \omega_2 = (J_1 + J_2) \cdot \omega_3$$

$$\omega_3 = \frac{J_1 \cdot \omega_1 - J_2 \cdot \omega_2}{(J_1 + J_2)} = \frac{\frac{1}{2} m_1 \cdot r_1^2 \cdot \omega_1 - \frac{1}{2} m_2 \cdot r_2^2 \cdot \omega_2}{\frac{1}{2} m_1 \cdot r_1^2 + \frac{1}{2} m_2 \cdot r_2^2} \cdot \frac{1}{m_1 \cdot r_1^2} = \frac{\omega_1 - \omega_2 \frac{m_2}{m_1} \cdot \frac{r_2^2}{r_1^2}}{1 + \frac{m_2}{m_1} \cdot \frac{r_2^2}{r_1^2}}$$

$$x \cdot y^2 = 4{,}5$$

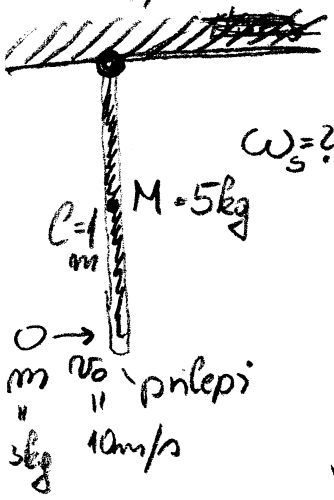
$$x = 2 \qquad y = 1{,}5$$

$$\frac{m_2}{m_1} = x \; ; \; \frac{r_2}{r_1} = y$$

$$= \frac{\omega_1 - \omega_2 x y^2}{1 + x y^2} =$$

$$\nu_3 = \frac{\nu_1 - 4{,}5 \cdot \nu_2}{1 + 4{,}5} = -0{,}45\,Hz$$ (vrti se v nasprotno smer kot prvi)

Str 24/8 (18)



$\omega_s = ?$ $\varphi_{max} = ?$

$\Gamma_z = \Gamma_K$

$\Gamma_z = \Gamma_1 = J_1 \cdot \omega_0 = m \cdot l^2 \cdot \frac{v_0}{l} = m \cdot l \cdot v_0$

$\Gamma_K = m \cdot L^2 \cdot \omega_s + \frac{1}{3} M \cdot L^2 \cdot \omega_s$

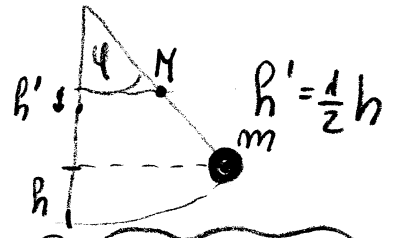
$\omega_s = \frac{m \cdot v_0 \cdot L}{m \cdot L^2 + \frac{1}{3} M \cdot L^2} = 1{,}53 Hz$

rotacijska kinetična energija

$W_{ROT} = \frac{1}{2} J \cdot \omega^2$ $\quad \Delta W = 0$

$W_{ROT} = \frac{1}{2} (J_1 + J_2) \omega_s^2$ $\quad W_{ROT} = 0 = W_p$

$W_{ROT} = \frac{1}{2} \cdot 1{,}53 Hz^2 \cdot \ldots = 2{,}3 J$



$h' = \frac{1}{2} h$

$h = L \cdot (1 - \cos\varphi)$

$W_{p1} = m \cdot g \cdot h$

$W_{p2} = \frac{1}{2} M \cdot g \cdot h$

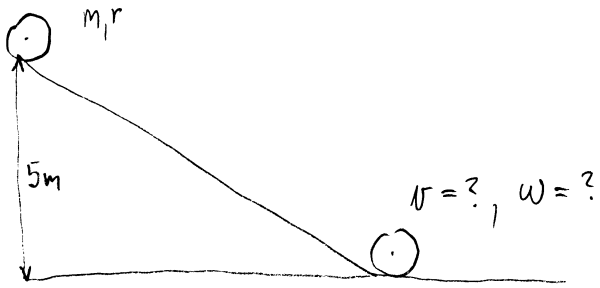
$W_{ROT} = m \cdot g \cdot h + \frac{1}{2} M \cdot g \cdot h = g \cdot h \left(m + \frac{1}{2} M\right)$

$h = \frac{W_{ROT}}{(m + \frac{1}{2} M) g} = \frac{2{,}3 J}{(0{,}3 + 1{,}5) \cdot 9{,}81} = 8{,}2 cm$

$\frac{h}{L} = 1 - \cos\varphi$

$\cos\varphi = 1 - \frac{h}{L} = 0{,}82 \Rightarrow \varphi = 23°$

STR 26 / NAL. 3



začetno končna

$W_z = W_k$

kinet. rotacijska

$W_p = W_k + W_R$

$m \cdot g \cdot h = \frac{1}{2} m \cdot v^2 + \frac{1}{2} J \cdot \omega^2$

$J_{krogle} = \frac{2}{5} m \cdot r^2$

$v = \omega \cdot r$

$\omega = \frac{v}{r}$

$v = 8{,}4\ m/s$

$\omega = 84\ s^{-1}$

STR 26 / NAL. 10

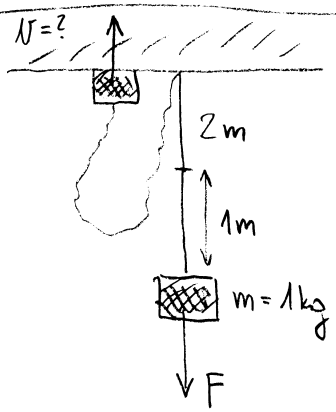
$h = 3m$

$l = 2m$

$k = 200\ N/m$

$x = 1m$

$v = ?$



PROŽNOSTNA E

$W_{pr} = \frac{1}{2} k x^2$ ← za koliko smo raztegnili

↓ raztezostni koeficient

$F = -k \cdot x$

$W_z = W_k$

$W_{pr} = W_{kin} + W_p$ (potencialna)

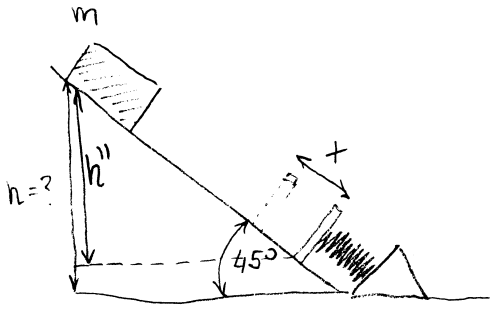
$\frac{1}{2} k x^2 = \frac{1}{2} m \cdot v^2 + m \cdot g \cdot h$

$-mgh + \frac{1}{2} k x^2 = \frac{1}{2} m \cdot v^2 \ / \cdot 2 \ / : m$

$-2gh + \frac{k x^2}{m} = v^2$

$v = \sqrt{\frac{k x^2 - 2mgh}{m}} = 11{,}8\ m/s$

STR. 20/NAL. 12 (20)



$m = 300\,kg$
$k = 10^5\,N/m$
$X = 1{,}2\,m$
$\varphi = 45°$

$v = ?$

$W_z = W_k$

$mgh'' = \frac{1}{2}mv^2$

$v = \sqrt{2gh''} = 21{,}5\,m/s$

$W_z = W_k$

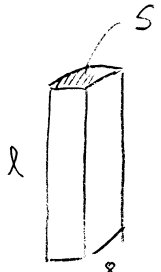
$m \cdot g \cdot h = m \cdot g \cdot h' + \frac{1}{2}k \cdot x^2$

$m \cdot g(h - h') = \frac{1}{2}k \cdot x^2$

$m \cdot g \cdot h'' = \frac{1}{2}k \cdot x^2$

$h'' = \frac{1k \cdot x^2}{2 \cdot mg} = 24\,m$

STR. 26/NAL. 1



$\left(\frac{F}{S}\right)_{max} = p_{max} = 4 \cdot 10^8\,N/m^2$

$d = 1\,mm$

$l = 2\,m$

$E = 2 \cdot 10^{11}\,\frac{N}{m^2}$

$\frac{X}{l} = ?$

$\frac{X}{l} = \frac{1}{E} \cdot \frac{F}{S} \Rightarrow F = \frac{ES}{l} \cdot X$ (k)

E ... prožnostni modul

natezna trdnost: $p_{max} = \left(\frac{F}{S}\right)_{max}$

$\left(\frac{X}{l}\right)_{max} = \frac{1}{E} \cdot \left(\frac{F}{S}\right)_{max}$

$\left(\frac{X}{2m}\right)_{max} = \frac{1 \cdot m^2}{2 \cdot 10^{11}\,N} \cdot 4 \cdot 10^8\,N/m^2$

$\frac{X}{l} = \frac{2}{1000} = 2‰$

STR. 27/NAL. 2

$R = 6400\,km$

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

$v = 5\,km/s$

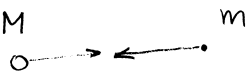
$r = R + h$

$h = r - R$

$h = 9600\,km$

$F_g = m \cdot g$ (g ... gravitac. konst.)

$F = \frac{G \cdot m \cdot M}{r^2}$



$G = 6{,}67 \cdot 10^{-11}\,\frac{m^3}{kg\,s^2}$ ali $\frac{N \cdot m^2}{kg^2}$

centripetalna: $F_g = F_{cp}$

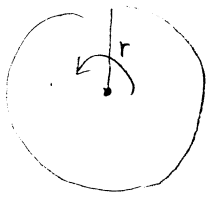
$\frac{G \cdot m \cdot M}{r^2} = \frac{m \cdot v^2}{r}$

$r = \frac{G \cdot M}{v^2} = \frac{6{,}67 \cdot 10^{-11}\,m^3 \cdot 6 \cdot 10^{24}\,kg \cdot s^2}{kg\,s^2 \cdot 25 \cdot 10^6\,m^2}$

$r = 1{,}6 \cdot 10^7\,m = 16000\,km$

$v = \omega \cdot r$ (omega zemlje)

$$v = \frac{2\pi}{T_0} \cdot r = \frac{2\pi}{86400\,s} \cdot 6400\,km = 0{,}46\ km/s$$



gravitacijska potencialna energija

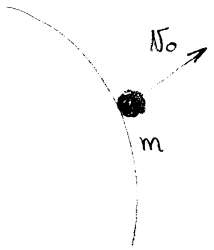
$$W_p = -\frac{G \cdot M \cdot m}{r}$$

STR. 27 / NAL. 3

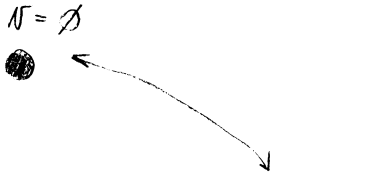
$M = 19 \cdot 10^{26}\,kg$

$R = 7 \cdot 10^4\,km$

$v_0 = ?$



$v = \infty$



$W_z = W_k$ (W_k, W_p)

$$\frac{1}{2} m \cdot v_0^2 - \frac{G \cdot M \cdot m}{R} = 0 - 0$$

$$v_0^2 = \frac{G \cdot M \cdot m \cdot 2}{R \cdot m}$$

$$v_0 = \sqrt{2 \cdot \frac{GM}{R}} = \sqrt{2 \cdot \frac{6{,}67 \cdot 10^{-11}\,m^3 \cdot 19 \cdot 10^{26}\,kg}{kg\,s^2 \cdot 7 \cdot 10^7\,m}}$$

$v_0 = 60\,km/s$

$$v = \sqrt{2 \cdot \frac{GM}{R}}$$

$$c^2 = 2\,\frac{GM}{R}$$

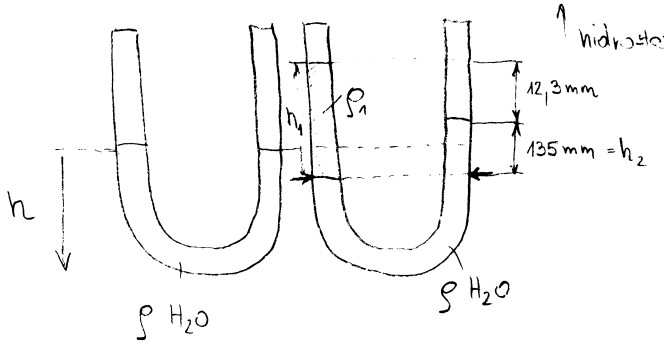
$$R = 2\,\frac{GM}{c^2}$$

$$R = 2 \cdot \frac{6{,}67 \cdot 10^{-11}\,m^3 \cdot 19 \cdot 10^{26}\,kg}{kg\,s^2 \cdot 9 \cdot 10^{16}\,m^2} = 1{,}4\,m$$

STR. 28 / NAL. 4. hidrostatika

$p = \rho \cdot g \cdot h$

↑ hidrostatski tlak



$\rho_1 = ?$

$\rho_{H_2O} = 10^3\,\frac{kg}{m^3}$

$p_1 = p_2$

$\rho_1 \cdot g h_1 = \rho_{H_2O} \cdot g \cdot h_2$

$$\rho_1 = \frac{\rho_{H_2O} \cdot g \cdot h_2}{g \cdot h_1} = \frac{\rho_{H_2O} \cdot h_2}{h_1}$$

$$\rho_1 = \frac{10^3\,kg \cdot 135\,mm}{m^3\ 147{,}3\,mm} = 916\ kg/m^3$$

Bernoullijeva enačba:

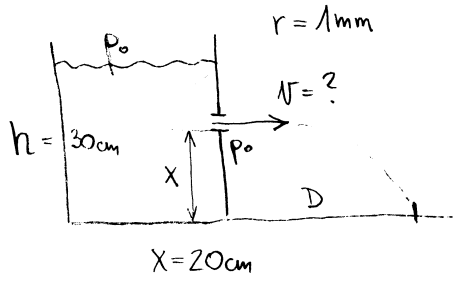
$$p_1 + \frac{\rho v_1^2}{2} + \rho g h_1 = p_2 + \frac{\rho v_2^2}{2} + \rho g h$$

p_2, v_2, h_2

p_1, v_1, h_1

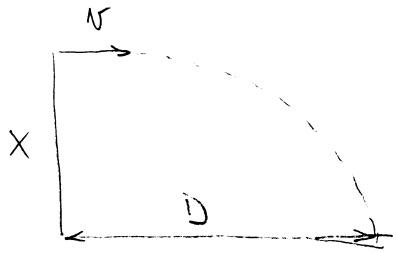
$$p_0 + \frac{\rho \cdot v_1^2}{2} + \rho \cdot g \cdot (h-x) = p_0 + \frac{\rho v_2^2}{2} + \rho \cdot g h$$

$$g(h-x) = \frac{v_2^2}{2}$$

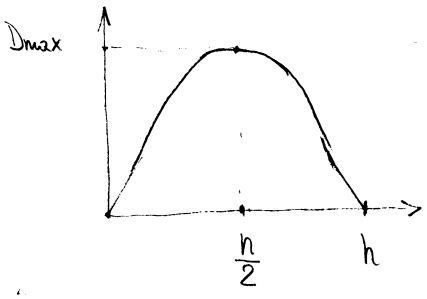


$$v^2 = 2g(h-x)$$

$$v = \sqrt{2g(h-x)} = 1{,}4\ m/s$$

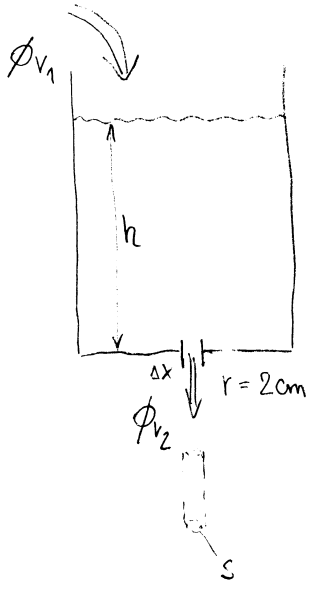


$$D = v_x \cdot t = v \cdot t = v\sqrt{\frac{2x}{g}} = 2\sqrt{x(h-x)} = \underline{28{,}3\ cm}$$



$D_{max} = 30\ cm$

STR. 28 / NAL 5.



$$\phi_V = 5\ dm^3/s = \frac{\Delta V}{\Delta t} \qquad \phi_m = \rho \cdot \phi_V$$

$$v = \sqrt{2gh}$$

$$\phi_{V_2} = \frac{\Delta V}{\Delta t} = \frac{S \cdot \Delta x}{\Delta t} = S \cdot v$$

$$\phi_{V_2} = S \cdot \sqrt{2gh} = \pi \cdot r^2 \cdot \sqrt{2gh}$$

$$\phi_{V_2}^2 = \pi^2 \cdot r^4 \cdot 2gh$$

$$h = \frac{\phi_{V_2}^2}{\pi^2 \cdot r^4 2g} = \frac{(5 \cdot 10^{-3}\ m^3/s)^2}{\pi^2 \cdot (0{,}02\ m)^4 \cdot 2 \cdot 10\ m/s^2} = \underline{0{,}79\ m}$$

$$= \underline{\underline{80\ cm}}$$