Часть 1

Олимпиада: **Физика, 11 класс (1 часть)**

Шифр: **21203080**

ID профиля: **322115**

Вариант 7

Чистовик

2. Продолжение

3)

$$КПД_1 = \frac{A}{Q_{пол}}$$

$$Q_{пол} = \Delta U_{01} + A_{10} = U_0 - U_1 + A_{10} = \frac{3}{2}p_0V_0\left(\sin\varphi\cos\varphi - \sin 30^\circ\cos 30^\circ\right) + A_{10}$$

$$A = A_{12} + A_{21} = \frac{p_0V_0}{8}\left(\pi - 4(\sqrt{3}-1)\right)$$

$$A_{21} = -(U_1 - U_2) = -\frac{3}{2}\nu R(T_1 - T_2) = -\frac{3}{8}p_0V_0(\sqrt{3}-1)$$

$$A_{12} = \frac{p_0V_0}{8}\left(\pi - (\sqrt{3}-1)\right)$$

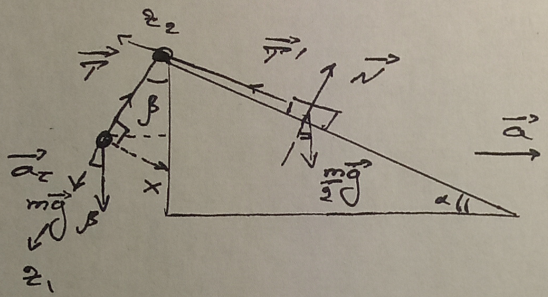
$$A_{10} = p_0V_0\left(\frac{\pi\cdot 60}{360} - \frac{\pi\cdot\varphi^\circ}{360} - \frac{1}{2}\sin 60^\circ\cos 60^\circ + \frac{1}{2}\sin\varphi\cos\varphi\right) = p_0V_0\left(\frac{\pi(60-\varphi)}{360}\right) -$$

$$- \frac{1}{4}\left(\frac{\sqrt{3}}{2} - \sin 2\varphi\right)$$

$$\eta = \frac{A_{12} + A_{21}}{Q_{10}} = \frac{\frac{\cancel{}}{8}\left(\pi - 4(\sqrt{3}-1)\right)}{\left(\frac{\pi(60-\varphi^\circ)}{360} - \frac{1}{4}\left(\frac{\sqrt{3}}{2} - \sin 2\varphi\right)\right) + \frac{3}{4}\left(\sin 2\varphi - \frac{\sqrt{3}}{2}\right)}$$

Чистовик

1. Решение



1) В проекции на ось X (см. рис.) для шарика:

$$mg\sin\beta = ma\cos\beta \Rightarrow a = g\,\mathrm{tg}\,\beta$$

(Т.к. $\vec{a}_{полн} = \vec{a} + \vec{a}_\tau$ ускорение относит клина)

Ответ: $a = g\,\mathrm{tg}\,\beta = \frac{4}{3}g$

2) На оси z_1, z_2 в системе отсчета „Клин". (Сила инерции $\vec{f}_i = -m\vec{a}$)

$$\begin{cases} mg\cos\beta + ma\sin\beta - T = ma_\tau & \text{– шарик} \\ T + \frac{m}{2}a\cos\alpha - \frac{m}{2}g\sin\alpha = \frac{m}{2}a_\tau & \text{– брусок} \end{cases}$$

; Откуда: $\left(\begin{matrix} \cos\alpha = \frac{5}{13} & \sin\alpha = \frac{12}{13} \\ \cos\beta = \frac{3}{5} & \sin\beta = \frac{4}{5} \end{matrix} \right)$

$$g\cos\beta + a\sin\beta + \frac{a}{2}\cos\alpha - \frac{g}{2}\sin\alpha = \frac{3}{2}a_\tau$$

$$g\left(\frac{3}{5} + \frac{4}{3}\cdot\frac{4}{5} + \frac{4}{3}\cdot\frac{5}{13}\cdot\frac{1}{2} - \frac{1}{2}\cdot\frac{12}{13}\right) = \frac{3}{2}a_\tau$$

$$a_\tau = \frac{2}{3}g\left(\cos\beta + \frac{4}{3}\sin\beta + \frac{2}{3}\cos\alpha - \frac{\sin\alpha}{2}\right) = \frac{2}{3}g\left(\frac{3}{5} + \frac{16}{15} + \frac{10}{39} - \frac{6}{13}\right)$$

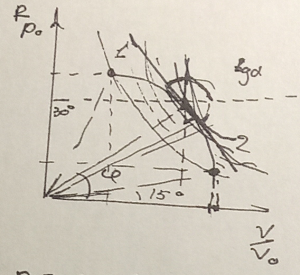
3) Время $\tau = \sqrt{\frac{2S}{a}} = \sqrt{\frac{2H}{a_\tau\cos\beta}} = \sqrt{\frac{2H}{\frac{2}{3}g\left(\cos\beta + \frac{4}{3}\sin\beta + \frac{2}{3}\cos\alpha - \frac{\sin\alpha}{2}\right)}} =$

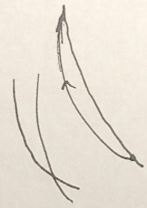
$$= \sqrt{\frac{3H}{g\left(\frac{3}{5} + \frac{16}{15} + \frac{10}{39} - \frac{6}{13}\right)}}$$

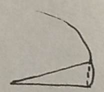
1

Черновик

$\left|\frac{T_1 - T_2}{T_2}\right| - ?$







1)

$p_2 = p_0 \sin 15°$

$V_2 = V_0 \cos 15$

$p_1 = p_0 \cos 30°$

$V_1 = V_0 \sin 30°$

$\frac{2\sin 30° \cos 30° - 2\sin 15 \cos 15}{2\sin 15 \cos 15} =$

$= \frac{\sin 60 - \sin 30}{\sin 30} = \frac{\frac{\sqrt{3}}{2} - \frac{1}{2}}{\frac{1}{2}} = \sqrt{3} - 1$

$pV = \nu RT$

2) $\delta Q = \delta A + dU = C\,dT = 0$

$\nu RT = pV$

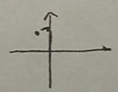
$dT = \frac{p\,dV + V\,dp}{\nu R}$

$p\,dV + \frac{3}{2}\nu R\,dT = 0$

$p\,dV + \frac{3}{2}p\,dV + \frac{3}{2}V\,dp = 0$

$\frac{5}{2}p\,dV + \frac{3}{2}V\,dp = 0$

$\frac{5}{3}\frac{dV}{V} + \frac{dp}{p} = 0$



$\operatorname{tg}\left(\frac{\pi}{2} + \alpha\right) = -\operatorname{ctg}\alpha$

$pV^{\frac{5}{3}} = \text{const}$

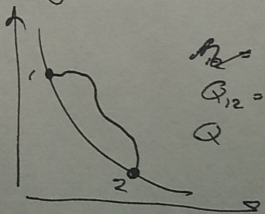
$pV^{\gamma} = \text{const}$

$\frac{dp}{dV} =$

$\gamma\frac{dV}{V} + \frac{dp}{p} = 0$

$\frac{dp}{dV} = -\frac{p}{V}\gamma$

$A_{12} + \Delta U_{12}$



$Q_{12} = A_{12} + \Delta U_{21}$

Q

$\operatorname{tg}\xi = -\frac{\sin\varphi}{\cos\varphi}\cdot\gamma = -\operatorname{tg}\varphi\cdot\gamma$

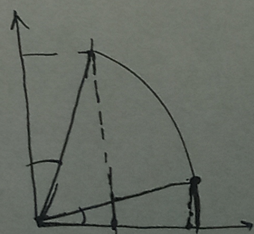
$\frac{A_{12} + \Delta U_{12}}{A_{12} + \Delta U_{21}}$

$\operatorname{tg}\left(\frac{\pi}{2} + \varphi\right) = -\operatorname{tg}\varphi\,\gamma$

$\frac{1}{\operatorname{tg}\varphi} = \operatorname{tg}\varphi\,\gamma$

$\operatorname{tg}\varphi = \sqrt{\frac{1}{\gamma}} = \sqrt{\frac{3}{5}}$

$\operatorname{tg}^2\varphi = \frac{1}{\gamma}$



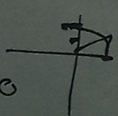
3) $\eta = \frac{Q \cdot A}{Q_{\text{пол}}}$

$p_0V_0\left(\frac{60}{180}\cdot\frac{\pi}{2} - \frac{15}{180}\cdot\frac{\pi}{2} + \frac{1}{2}\cos 15 \sin 15 - \frac{1}{2}\cos 60 \sin 60\right) = A_{12}$

$A_{21} + \Delta U_{21} = 0$

$A_{21} = -\frac{3}{2}\nu R(T_1 - T_2)$

$\frac{A_{12} + A_{21}}{Q} = \frac{A_{12} + A_{21}}{A_{12} + \Delta U_{12}}$

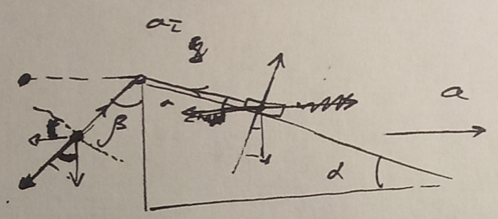


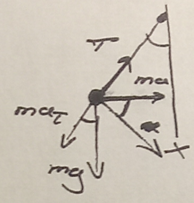
$90 + 30$

$\pi - (\sqrt{3} - 1) - 3\sqrt{3} - 1$

$\pi - 4(\sqrt{3} - 1)$

Черновик





$2T + \frac{m}{2} a\cos\alpha = a_\tau \frac{m}{2}$

$mg\cos\beta - T + ma\sin\beta = ma_\tau$

$mg\sin\beta = ma\cos\beta$

$a = g\,tg\beta$

$-\frac{m}{2}g\sin\alpha + \frac{m}{2}$

$2mg\cos\beta - 2T + 2ma\sin\beta = 2ma_\tau$

$2T + ma\cos\alpha - mg\sin\alpha = ma_\tau$

$2mg\cos\beta + 2ma\sin\beta + ma\cos\alpha - mg\sin\alpha = 3ma_\tau$

$g(2\cos\beta - \sin\alpha) + 2g\,tg\beta\sin\beta + 2g\,tg\beta\cos\alpha = 3a_\tau$

$a_\tau \cos$ — ..

$\sin\beta\ \frac{4}{5}$ $\qquad \frac{4}{3}$

$\sin\alpha = \frac{12}{13}$

$\frac{9}{15} + \frac{16}{15} + \frac{10}{6\cdot 13} - \frac{36}{13\cdot 6} =$

$= \frac{25}{15} - \frac{26}{6\cdot 13} = \frac{1}{3}$ (

$pV^\gamma = c$

$\frac{dp}{p} = -\gamma\frac{dV}{V}$

$\frac{dp}{dV} = -\gamma\frac{p}{V} = $ $tg\varphi$ $\gamma = \frac{1}{tg\varphi}$

$tg\varphi = \sqrt{\frac{1}{\gamma}}$)

$\frac{at^2}{2} = \frac{H}{\cos\beta}$

$t = \sqrt{\frac{2H}{a\cos\beta}}$

$Q_{12} = A_{12} + U_2 - U_1 = A_{12} + A_{21}$

$A_{12} + A_{21}$

$Q_{21} = 0 = A_{21} + U_1 - U_2$

$A_{21} = U_2 - U_1$

Чистовик

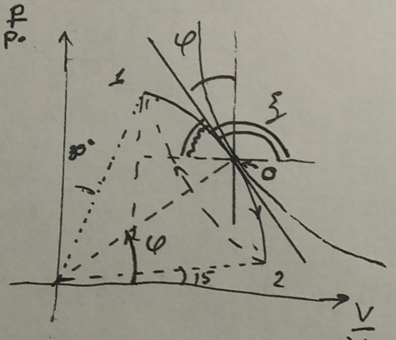
2. Решение.

1) Из графика найдём: $p_1 = p_0 \cos 30^\circ$ $\quad V_1 = V_0 \sin 30^\circ$

$p_2 = p_0 \sin 15^\circ$ $\quad V_2 = V_0 \cos 15^\circ$, тогда (Используя у-е Менделеева-Клап-на)

$$\Theta = \frac{T_1 - T_2}{T_2} = \frac{p_1 V_1 - p_2 V_2}{p_2 V_2} = \frac{\cos 30^\circ \sin 30^\circ - \cos 15^\circ \sin 15^\circ}{\cos 15^\circ \cdot \sin 15^\circ} = \frac{\sin 60^\circ - \sin 30^\circ}{\sin 30^\circ} = \sqrt{3} - 1$$

Ответ: $\sqrt{3} - 1$

2) 

Точка O – точка касания адиабаты.

I Начало Термодинамики:

$$\delta Q = \delta A + dU = \overset{0}{C} dT, \text{ з-н}$$

$$\delta A + dU = 0$$

$$p dV + \frac{3}{2} \nu R dT = 0$$

$$p dV + \frac{3}{2}(p dV + V dp) = 0$$

$$\frac{5}{2} p dV + \frac{3}{2} V dp = 0 \text{, т.е } \frac{dp}{dV} = -\frac{5}{3}\frac{p}{V}$$

$$\text{Т.к. } \frac{dp}{dV} = \operatorname{tg}\xi = -\frac{5}{3}\frac{\sin\varphi}{\cos\varphi} = -\frac{5}{3}\operatorname{tg}\varphi$$

Из рисунка: $\operatorname{tg}\xi = \operatorname{tg}\left(\frac{\pi}{2} + \varphi\right) = -\operatorname{ctg}\varphi = -\frac{5}{3}\operatorname{tg}\varphi$

$$\operatorname{tg}^2\varphi = \frac{3}{5} \Rightarrow \operatorname{tg}\varphi = \sqrt{\frac{3}{5}}$$

Ответ: $\operatorname{tg}\varphi = \sqrt{3/5} = \sqrt{\frac{1}{\gamma}}$

3) КПД: $\eta = \frac{A}{Q_{пол}} = \frac{A_{12} + A_{21}}{Q_{12}}$

$$Q_{12} = A_{12} + \Delta U_{12}$$

$$Q_{21} = 0 = A_{21} + \Delta U_{21} \Rightarrow A_{21} = -\frac{3}{2}\nu R(T_1 - T_2) = -\frac{3}{2} p_0 V_0 \left(\frac{\sin 60^\circ}{2} - \frac{\sin 30^\circ}{2}\right) = -\frac{3}{4} p_0 V_0 \frac{\sqrt{3}-1}{2}$$

Из рисунка $A_{12} = p_0 V_0 \left(\frac{60}{180}\cdot\pi\cdot\frac{1}{2} - \frac{15}{360}\pi - \frac{1}{2}\sin 60^\circ \cos 60^\circ + \frac{1}{2}\sin 15^\circ \cos 15^\circ\right) =$

$$A_{12} = p_0 V_0 \left(\frac{45}{360}\cdot\pi - \frac{1}{4}(\sin 120^\circ - \sin 30^\circ)\right) = \frac{p_0 V_0}{8}\left(\pi - (\sqrt{3} - 1)\right)$$

$$\Delta U_{12} = \frac{3}{2}\nu R(T_2 - T_1) = -\frac{3}{8} p_0 V_0 \quad \dots\dots$$

Или:

$\cancel{A_{21} = -\Delta U_{21} = \Delta U_{12}}$

$\cancel{Q_{12} = A_{12} + \Delta U_{12}}$

$\cancel{\eta = \frac{A_{12} + A_{21}}{Q_{12}} = \frac{A_{12} + A_{21}}{A_{12} + \Delta U_{12}} = 1}$ ~~?! Возможно пренебрегать теплообменом не стоило~~

~~Ответ: $\eta = 1$~~

Часть 2

Олимпиада: **Физика, 11 класс (2 часть)**

Шифр: **21203080**

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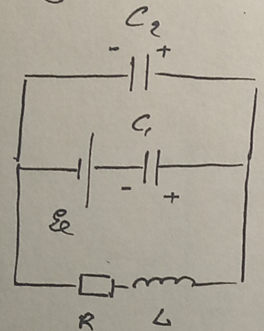
Вариант 7

Чистовик

3. Решение

1) При замыкании сохраняется поток в катушке: $I=0$



По правилу Кирхгофа:

$$\mathcal{E} - \frac{q_1}{C_1} + \frac{q_2}{C_2} = 0 \Rightarrow \mathcal{E} = +q_1\frac{(C_1+C_2)}{C_1C_2}$$

$$q_1 + q_2 = 0$$

Тогда $q_2 = -\frac{\mathcal{E}C_1C_2}{C_1+C_2}$

$U_2 = U_L = -\frac{q_2}{C_2} = \frac{C_1\mathcal{E}}{C_1+C_2}$; , Тогда:

$$U_2 = L\dot{I} \Rightarrow \dot{I} = \frac{C_1\mathcal{E}}{C_1+C_2}\cdot\frac{1}{L} = \frac{\mathcal{E}}{5L}$$

2) После прохождения всех переходных процессов ток станет равным нулю $I=0$, тогда

$$\frac{q_2}{C_2} = 0; \qquad \mathcal{E} - \frac{q_1'}{C_1} = 0 \qquad q_1' = C_1\mathcal{E}$$

$A_{источн} = \Delta W_C + Q$; $A_{источн} = \Delta q\cdot\mathcal{E} = (q_1' - q_1)\mathcal{E} = C_1\left(1 - \frac{C_2}{C_1+C_2}\right)\mathcal{E}^2 = \frac{C_1^2\mathcal{E}^2}{C_1+C_2}$

$$\Delta W_C = \frac{q_1'^2}{2C_1} - \frac{1}{2}\frac{C_1C_2}{C_1+C_2}\mathcal{E}^2 = \frac{C_1\mathcal{E}^2}{2} - \frac{C_1C_2}{C_1+C_2}\frac{\mathcal{E}^2}{2} = \frac{C_1\mathcal{E}^2}{2}\left(1 - \frac{C_2}{C_1+C_2}\right) = \frac{C_1^2\mathcal{E}^2}{2(C_1+C_2)}$$

Откуда:

$$Q = A_{ист} - \Delta W = \frac{1}{2}\frac{C_1^2\mathcal{E}^2}{(C_1+C_2)} = \frac{C\mathcal{E}^2}{10}$$

3) $\frac{d}{dt}\left(\mathcal{E} - \frac{q_1}{C_1} + \frac{q_2}{C_2}\right) = 0$ $\qquad -\dot{q}_1 - \dot{q}_2 = I$

$-\frac{\dot{q}_1}{C_1} + \frac{\dot{q}_2}{C_2} = 0$ $\qquad -\dot{q}_1 - \frac{C_2}{C_1}\dot{q}_1 = I$

$-\dot{q}_1 = I_0$ $\qquad -\dot{q}_1\left(1 + \frac{C_2}{C_1}\right) = I = I_0\left(1 + \frac{C_2}{C_1}\right)$

$$I = I_0\left(1 + \frac{C_2}{C_1}\right) = I_0(1+4) = 5I_0$$

1

Чистовик

5. Решение

Глаз, глядя на действительный предмет формирует действит. изображение

~~[illegible]~~ D_1 – ~~[illegible]~~ для удаленных предметов

1) D_2 – для ~~d~~ = 25 см

$$\begin{cases} D + D_1 = \dfrac{1}{f} \\ D + D_2 = \dfrac{1}{f} + \dfrac{1}{25} \\ D = \dfrac{1}{f} + \dfrac{1}{x} \end{cases}$$

$\dfrac{D_1}{D_2}$ или $\dfrac{D_2}{D_1} = 3$

$x > 0$

$$D_1 - D_2 = -\frac{1}{25}$$

$D_1 = -\dfrac{1}{x}$, т.е $D_1 < 0$, зн $D_1 = 3D_2$, тогда

$$\frac{2}{3}D_1 = -\frac{1}{25} \Rightarrow D_1 = -\frac{3}{50}\ см^{-1} = -0{,}06\ см^{-1}$$

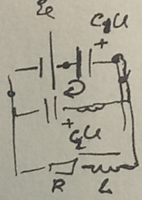
$$x = -\frac{1}{D_1} = \frac{50}{3}\ см$$

2) $\begin{cases} D + D_x = \dfrac{1}{f} + \dfrac{1}{50} \\ D + D_1 = \dfrac{1}{f} \end{cases} \Rightarrow D_x = D_1 + \dfrac{1}{50} = -\dfrac{2}{50} = -0{,}04\ см^{-1}$

3

Черновик.

3. 1) $I_L = 0$



$\mathcal{E} - \frac{q}{C_2} - \cancel{\ldots} =$

$\mathcal{E} = \left(\frac{C_1C_2}{C_1+C_2}\right)^{-1} \cdot q = \frac{q(C_1+C_2)}{C_1C_2}$

$q = \frac{C_1C_2\mathcal{E}}{C_1+C_2}$ $\quad \frac{q}{C_1} = \frac{C_2\mathcal{E}}{C_1+C_2} = U$

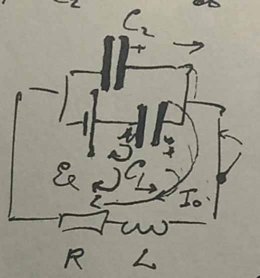
$U = +L\dot{I}$

$\dot{I}_0 = \frac{U}{L} = \frac{C_2\mathcal{E}}{C_1+C_2} \cdot \frac{1}{L}$

2)

$\mathcal{E} - \frac{q_1}{C_1} - \frac{q_2}{C_2} = -L\overset{\overset{0}{\shortparallel}}{\dot{I}}$

$\mathcal{E} \cdot q_1 =$



$\mathcal{E} - \frac{q_1}{C_1} = IR$

$\frac{q_2}{C_2} = IR$

$C_1\left(1 - \frac{C_2}{C_1+C_2}\right) \frac{C_1^2}{C_1+C_2}$

$C_1\left(\frac{C_2}{C_1+C_2} - 1\right) =$

$= \frac{C_1}{C_1+C_2}$ $\quad q_1 + q_2 = 0$

$A_{ист} = \Delta W_1 + \Delta W_2 + \Delta W_L + Q$

$\mathcal{D}_1 + \mathcal{D}_2$

$\mathcal{D} + \mathcal{D}_1 = \frac{1}{f}$

$- \quad \mathcal{D} + \mathcal{D}_2 = \frac{1}{f} + \frac{1}{25}$

$\mathcal{D} = \frac{1}{f} + \frac{1}{x}$

$\frac{\mathcal{D}_2}{\mathcal{D}_1} = 3$

$\frac{\mathcal{D}_2}{3} - \mathcal{D}_1 = \frac{1}{25}$

$2\mathcal{D}_1 = \frac{1}{25}$

$\mathcal{D}_1 = \frac{1}{50}$

$-\frac{2}{3}\mathcal{D}_1 = \frac{1}{25}$

$\mathcal{D}_1 = -\frac{3}{50}$

$\mathcal{D}_2 = -\frac{1}{50}$

$\mathcal{D}_1 = -\frac{1}{25}$

$\mathcal{D}_1 = -\frac{1}{x}$

$x = -\frac{1}{\mathcal{D}_1} = +\frac{50}{3} < 25$

2) $\frac{1}{50} + \frac{1}{f} = \mathcal{D} + \mathcal{D}_x$

$\mathcal{D}_1 - \mathcal{D}_x = -\frac{1}{50}$

$\mathcal{D}_x = \mathcal{D}_1 + \frac{1}{50} = -\frac{2}{50}$

$-0{,}04$

$-0{,}06$

$-0{,}02$

$\frac{q_2}{C_2} = R\overset{\overset{0}{\shortparallel}}{i}$

$-\frac{q_1}{C_1} + \mathcal{E} = Ri = 0$

$\mathcal{E} \quad q_1' = \mathcal{E}C_1$

$A = (q_1' - q_1)\mathcal{E} = \frac{q_1'^2}{2C_1} - \frac{q^2}{2C_2} + Q$

$Q = \ldots$

$\mathcal{E} - \frac{q_1}{C_1} = IR - L\dot{I}$

$\frac{q_2}{C_2} = IR - L\dot{I}$

$\dot{q}_2 + \dot{q}_1 = -I$

$\mathcal{E} - \frac{q_1}{C_1} - \frac{q_2}{C_2} = 0$

$\frac{\dot{q}_1}{C_1} = -\frac{\dot{q}_2}{C_2}$

$\dot{q}_1\left(1 - \frac{C_2}{C_1}\right) = -I$

$I = 3I_0$

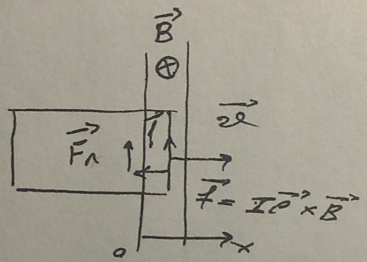
$\frac{C_1C_2}{C_1+C_2}\frac{\mathcal{E}^2}{2}$

$\frac{q_1^2}{2C_1} \quad \left(\frac{C_1C_2}{C_1+C_2}\right)^2\mathcal{E}^2 + \frac{C_1^2C_2}{2} \quad \frac{C\mathcal{E}^2}{2}$

21203080 (U322115 M1264440)

Чистовик

4. Решение



1) На электроны действует сила Лоренца, кот-я приводит к возникновению ЭДС

$\vec{F}_л = e\vec{v}\times\vec{B}$, т.е $\mathcal{E} = vBl$

ЭДС приводит к возникновению тока:

$\frac{\mathcal{E}}{R} = I$, на проводник с током действует сила Ампера:

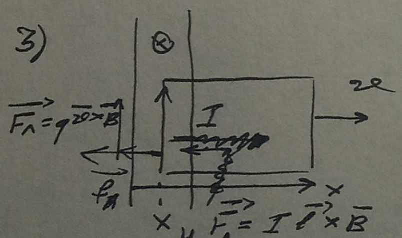
$\vec{F}_A = I\vec{l}\times\vec{B}$ => $F_x = -IlB = -\frac{v(Bl)^2}{R} = ma$, т.е $|a|_0 = \frac{v_0(Bl)^2}{mR} = \frac{v_0(Bd)^2}{mR}$

2) $a = \frac{dv}{dt} = -v\frac{(Bl)^2}{mR} = v\cdot\Theta$

$dv = -\Theta\cdot v\,dt = -\Theta\,dx$ => $\int_{v_0}^{v_1} dv = -\int_0^H \frac{(Bl)^2}{mR}dx$

$v_1 = v_0 - \frac{(Bl)^2}{mR}\cdot H = v_0 - \frac{(Bd)^2}{mR}\frac{d}{5}$

3)



Аналогично, применяя правило Ленца:

$a_x = -\frac{v(Bd)^2}{mR}$

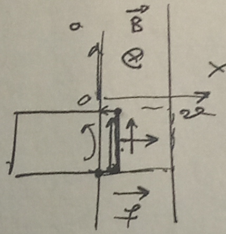
В промежуточный момент у рамки нет ускорения.

$\int_{v_1}^{v_2} dv = -\int_0^H \frac{(Bd)^2}{mR}dx$

$v_2 = v_1 - \frac{(Bd)^2}{mR}\frac{d}{5} = v_0 - \frac{2(Bd)^2}{mR}\frac{d}{5}$

2

Черновик.



$q\,\vec{v}\times\vec{B} = F = qE$

$\boxed{vBl = \mathcal{E}_i}$

$\mathcal{E}_i = I\cdot R$

$I\,d\vec{l}\times\vec{B} = IlB = F = ma$

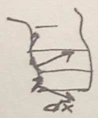
$\Phi = \vec{B}\cdot d\vec{S}$

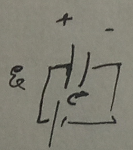
$a = \frac{v(Bl)^2}{mR}$ $\quad a = \frac{v(Bl)^2}{mR}$

$A = \delta\Phi I$

$\delta A = I\,d\vec{l}\times\vec{B} = I\cdot(d\vec{l}\times\vec{B})\,d\vec{x} = I\,\vec{B}\,(d\vec{x}\times d\vec{l}) \ldots - \vec{B}(dx\cdot dl)$

$\vec{a}(\vec{b}\times\vec{c}) = b(ac) - c(ab)$ $\qquad I\vec{B}\,d\vec{S} = I\,d\Phi$





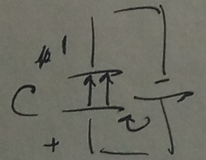
$I\Delta\Phi$

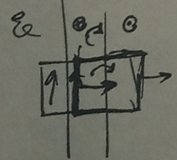
$\int_{v_0}^{v}\frac{dv}{v} = \frac{(Bl)^2}{mR}\cdot dt$

$\int_{v_0}^{v} dv = \int_0^{d/5 = H}\frac{(Bl)^2}{mR}\,dx$

2) $\left[\, v_x = v_0 + \frac{(Bl)^2}{mR}H \,\right]$

$v = \frac{(Bl)^2}{mR}x + C$



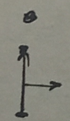


$I\,\vec{l}\times\vec{B}$

$a = \frac{v_x(Bl)^2}{mR}$

$\int_{v_x}^{v'} dv = \frac{(Bl)^2}{mR}\cdot H$

$v' = v_x + 2H\left(\frac{Bl}{mR}\right)$



$D + D_1 = \cdot$

$D - D_1 = \frac{1}{f}$

$D - D_2 = \frac{1}{f} + \frac{1}{25}$

$D_1 - D_2 = \frac{1}{25}$

$D_1 = 3D_2$

$\frac{2D_1}{3} = \frac{1}{25}$

$\frac{D_1}{D} = 3$

$D > 0$

$D_1 = \frac{1}{f}$

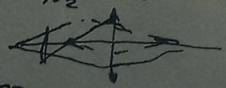
$D_1 \quad D_1 =$

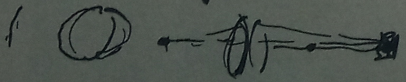
$D = \frac{1}{R}$ $\qquad F \sim R$

5.

D_1 - уд. предм

D_2 - чтение -





$\underbrace{(D + D_1)} = \frac{1}{d}$

$\underbrace{(D + D_2)} = \frac{1}{d} + \frac{1}{f}$

$\frac{D_1}{D_2} = 3$ $\qquad -\frac{3}{50} = D_1$

$\frac{D_2}{D_1} = 3$

$\frac{2D_1}{3} = -\frac{1}{f} = -\frac{1}{25}$ $\qquad 2D_1 = \frac{1}{f}$ $\quad D_1 =$

$D_1 - D_2 = -\frac{1}{f}$

$D_1 - 2D_1 = -\frac{1}{f}$

$D_1 = \frac{1}{2f} = \frac{1}{50}$

$D_* = \frac{1}{d} + \frac{1}{f_x}$

$D_* + D_1 = \frac{1}{d}$

$D + D_1 = \frac{1}{f}$

$D + D_2 = \frac{1}{f} + \frac{1}{25}$ $\quad \frac{1}{25} + \frac{1}{f} = D_{3}$; $D_1 = \frac{1}{f_x}$

$\underline{D_1 + D = \frac{1}{d} + \frac{1}{\infty}}$

$\frac{1}{d} + \frac{1}{f} =$

$1 + \frac{1}{f} = D$

$f_x = 50$

$D = \frac{1}{f} + \frac{1}{x}$ $\qquad D_3 - D = \frac{1}{25} : 1$

$D_1 = -\frac{1}{x}$ $\qquad -1 + \frac{1}{25}$

$D_1 - D_2 =$

$\frac{D_1}{D_2} =$

$\frac{1}{25} + \frac{1}{f} = \frac{1}{F} = D_3$

$\frac{1}{25} + \frac{1}{f} = \frac{1}{F}$

$\frac{1}{f} = D$

$\frac{1}{25} = D_3 - D$

$D = D_3 - \frac{1}{25}$

$D + D_x = D_3$

$\frac{1}{25} + \frac{1}{f} = D$ $\quad 7^\circ$

$D_3 = D + D_{очк}$

$D_{очк} < 0$