Формули – Физика I част

$$a_\tau = \frac{dv}{dt}, \quad a_n = \frac{v^2}{R}$$

$$F = \frac{mv^2}{R}$$

$$E_p = mgh$$

$$F = -kx$$

$$E_p = \frac{kx^2}{2}$$

$$\vec{F} = -grad(E_p)$$

$$y' = y \ , \quad z' = z$$

$$x' = \frac{(x - v_0 t)}{\sqrt{1 - \left(\frac{v_0}{c}\right)^2}},$$

$$t' = \frac{t - \frac{v_0 x}{c^2}}{\sqrt{1 - \left(\frac{v_0}{c}\right)^2}}$$

$$\Delta t = \frac{\Delta t'}{\sqrt{1 - \left(\frac{v_0}{c}\right)^2}}$$

$$l = l'\sqrt{1 - \left(\frac{v_0}{c}\right)^2}$$

$$v' = \frac{v - v_0}{1 - \frac{v v_0}{c^2}}$$

$$m = \frac{m_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$E = mc^2$$

$$E = \sqrt{p^2c^2 + (m_0c^2)^2}$$

$$\omega = 2\pi\nu$$

$$\frac{d^2x}{dt^2} + \omega_0^2 x = 0$$

$$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{l}{g}}$$

$$e^{i\omega t} = \cos(\omega t) + i\sin(\omega t),$$

$$A = \sqrt{A_1^2 + A_2^2 + 2A_1A_2\cos(\varphi_1 - \varphi_2)}$$

$$F_{mp.} = -rv$$

$$\frac{d^2x}{dt^2} + 2\beta\frac{dx}{dt} + \omega_0^2 x = 0$$

$$x = Ae^{-\beta t}\cos(\omega' t + \varphi_0)$$

$$\frac{d^2x}{dt^2} + 2\beta\frac{dx}{dt} + \omega_0^2 x = a_0 cos(\omega t),$$

$$A = \frac{a_0}{\sqrt{\left(\omega^2 - \omega_0^2\right)^2 + 4\beta^2\omega^2}}$$

$$\omega_{рез}^2 = \omega_0^2 - 2\beta^2$$

$$\lambda = \frac{a(t)}{a(t+T)} = \beta T$$

$$Q = \frac{\pi\nu}{\beta}$$

$$\xi(\vec{r}, t) = A\cos(\omega t - \vec{k}\cdot\vec{r}) = Ae^{i(\omega t - \vec{k}\cdot\vec{r})}$$

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

$$\lambda = vT$$

$$\Delta\xi = \frac{1}{v^2}\frac{\partial^2\xi}{\partial t^2}$$

$$\xi(r, t) = \frac{C}{r}e^{i(\omega t - kr)}$$

$$\xi(r, t) = \frac{C}{\sqrt{r}}e^{i(\omega t - kr)}$$

$$S_1v_1 = S_2v_2$$

$$p_1 + \rho\frac{v_1^2}{2} + \rho g h_1 = p_2 + \rho\frac{v_2^2}{2} + \rho g h_2$$

$$F = \eta S\frac{dv}{dz}$$

$$Re = \frac{\rho v l}{\nu}$$

$$\overline{E}_k = \frac{3}{2}kT$$

$$dQ = dU + pdV$$

$$C_V = \frac{i}{2}R$$

$$C_p = C_v + R$$

$$\frac{1}{N}\frac{dN}{dv_x} = \left(\frac{m}{2\pi kT}\right)^{1/2} e^{-\frac{mv^2}{2kT}}$$

$$f(v) = \frac{1}{N}\frac{dN}{dv} = 4\pi\left(\frac{m}{2\pi kT}\right)^{3/2} v^2 e^{-\frac{mv^2}{2kT}}$$

$$p = p_0 e^{-\frac{Mgh}{RT}}$$

$$n = n_0 e^{-\frac{E_p}{kT}}$$

$$\frac{dN}{N} = Ae^{-\frac{E_k + E_p}{kT}} dx\,dy\,dz\,dv_x dv_y dv_z$$

$$\lambda = \frac{1}{\sqrt{2}\sigma n}$$

$$\frac{\Delta N}{\Delta t} = \frac{1}{6}\bar{v}nS$$

$$\eta = \frac{1}{3}\rho\bar{v}\lambda$$

$$\kappa = \frac{1}{3}\rho\bar{v}\lambda C_V$$

$$D = \frac{1}{3}\bar{v}\lambda$$

$$A_{12} = q(\varphi_1 - \varphi_2)$$

$$\vec{E} = -grad\varphi$$

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

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

$$\Phi = \iint \vec{E} \cdot \vec{n} dS$$

$$\Phi = \frac{Q}{\varepsilon_0}$$

$$\vec{p_e} = \varepsilon_0 \beta \vec{E},$$

$$\vec{P} = \varepsilon_0 \kappa \vec{E}$$

$$D = \varepsilon_0 E + P$$

$$\varepsilon_r = 1 + \kappa$$

$$\vec{D} = \varepsilon_0 \varepsilon_r \vec{E}$$

$$\oiint \vec{D} \cdot \vec{n} dS = q$$

$$\Gamma = \oint \vec{E} \cdot d\vec{l}$$

$$\mathcal{E} = \oint \vec{E} \cdot d\vec{l}$$

$$I = \frac{dQ}{dt}$$

$$j = \frac{dI}{dS_\perp}$$

$$j = neu$$

$$\vec{j} = \sigma \vec{E}$$

$$\sigma = \frac{ne^2\lambda}{2mv}$$

$$Q = i^2 Rt$$

$$\vec{p}_m = IS\vec{n},$$

$$B = \frac{M_{max}}{p_m}$$

$$d\vec{B} = \frac{\mu_0 I}{4\pi r^3} d\vec{l} \times \vec{r},$$

$$B = \frac{\mu_0 I}{2\pi a}$$

$$\oiint \vec{B} \cdot d\vec{S} = 0$$

$$d\vec{F} = I(d\vec{l} \times \vec{B})$$

$$\vec{F}_L = q\vec{v} \times \vec{B}$$

$$\Delta\varphi = \frac{IB}{nqb} = R\frac{IB}{b}$$

$$\mathcal{E} = -\frac{d\Phi}{dt},$$

$$p_m = -\frac{e}{2m} L$$

$$\mu_r = 1 + \chi$$

$$\vec{M} = \chi \vec{H}$$

$$\vec{B} = \mu_0 \vec{H} + \mu_0 \vec{M}$$

$$\oint \vec{M} \cdot d\vec{l} = I_{\text{инд.}}$$

$$\oint \vec{H} \cdot d\vec{l} = I_{\text{своб.}}$$

$$\frac{\sin\alpha}{\sin\beta} = n$$

$$x_n = \frac{nL\lambda}{d}$$

$$r_k = \sqrt{kl\lambda}$$

$$I = I_0 \cos^2\alpha$$

Константи

$$\varepsilon_0 = 8.854187 \cdot 10^{-12}\text{F/m}$$

$$\mu_0 = 4\pi \cdot 10^{-7}\text{H/m}$$

$$e = 1.60217733 \cdot 10^{-19}\text{C}$$