Aide-mémoire

Constantes physiques

$m_e = 9{,}109 \times 10^{-31}\text{kg}$

$e = 1{,}602 \times 10^{-19}\text{C}$

$\varepsilon_0 = 8{,}854 \times 10^{-12}\ \text{C}^2/\text{N} \cdot \text{m}^2$

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

$u = 1{,}661 \times 10^{-27}\text{kg}$

$m_p = 1{,}673 \times 10^{-27}\text{kg}$

$k = \dfrac{1}{4\pi\varepsilon_0} = 8{,}99 \times 10^9\ \text{N} \cdot \text{m}^2/\text{C}^2$

$1\ \text{eV} = 1{,}602 \times 10^{-19}\text{J}$

$\text{N}_\text{A} = 6{,}023 \times 10^{23}\text{mol}^{-1}$

$g = 9{,}81\ \text{m/s}^2$

Mécanique

$$v_{xf} = v_{xi} + a_x t \qquad x_f = x_i + v_{xi}t + \frac{1}{2}a_x t^2 \qquad v_{xf}^2 = v_{xi}^2 + 2a_x(x_f - x_i)$$

$$F_g = mg \qquad \sum \vec{\mathbf{F}} = m\vec{\mathbf{a}} \qquad a_c = \frac{v^2}{r}$$

$$W = \vec{\mathbf{F}} \cdot \Delta\vec{\mathbf{s}} = F\Delta s\cos\theta \qquad W = \int \vec{\mathbf{F}} \cdot d\vec{\mathbf{s}} \qquad W = \Delta K$$

$$K = \frac{1}{2}mv^2 \qquad W = -\Delta U \qquad \Delta K + \Delta U = W_{ext}$$

$$P = \frac{dE}{dt} \qquad \sum \vec{\boldsymbol{\tau}} = I\vec{\boldsymbol{\alpha}} \qquad \omega = 2\pi f = \frac{2\pi}{T}$$

Électricité et magnétisme

$$\vec{\mathbf{F}}_{12} = \frac{kq_1q_2}{r^2}\vec{\mathbf{u}}_{\mathrm{r}_{12}} \qquad \vec{\mathbf{F}}_{12} = q\vec{\mathbf{E}} \qquad \vec{\mathbf{E}} = \frac{kq_1}{r^2}\vec{\mathbf{u}}_\mathrm{r}$$

$$\lambda = \frac{q}{L} = \frac{dq}{d\ell} \qquad \sigma = \frac{q}{A} = \frac{dq}{dA} \qquad \rho = \frac{q}{V} = \frac{dq}{dV}$$

$$\vec{\mathbf{E}} = \int \frac{kdq_1}{r^2}\vec{\mathbf{u}}_\mathrm{r} \qquad \Phi_E = \oint \vec{\mathbf{E}} \cdot d\vec{\mathbf{A}} = \frac{q_{int}}{\varepsilon_0} \qquad \Delta V = \frac{\Delta U}{q_0}$$

$$V_B - V_A = -\int_A^B \vec{\mathbf{E}} \cdot d\vec{\mathbf{s}} \qquad V = \frac{kQ}{r} \qquad V = \int \frac{kdq}{r}$$

$$U = \sum_{i<j} \frac{kq_1q_2}{r_{ij}} \qquad C = \frac{Q}{\Delta V} \qquad C = \frac{\varepsilon_0 A}{d}$$

$$C_{\text{éq}} = C_1 + C_2 + C_3 + \cdots \qquad \frac{1}{C_{\text{éq}}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \cdots \qquad U = \frac{Q^2}{2C} = \frac{1}{2}C\Delta V^2 = \frac{1}{2}Q\Delta V$$

$C = \kappa C_0$

$I = \dfrac{dq}{dt}$

$I = nqv_dA$

$J = \dfrac{I}{A}$

$\Delta V = RI$

$P = I\Delta V = RI^2 = \dfrac{\Delta V^2}{R}$

$R = \dfrac{\rho\ell}{A}$

$\rho = \rho_0[1 + \alpha(T - T_0)]$

$R_{éq} = R_1 + R_2 + R_3 + \cdots$

$\dfrac{1}{R_{éq}} = \dfrac{1}{R_1} + \dfrac{1}{R_2} + \dfrac{1}{R_3} + \cdots$

$\sum I = 0$

$\sum \Delta V = 0$

$\tau = RC$

$q = Q_0 e^{-t/\tau}$

$q = Q_0\left(1 - e^{-t/\tau}\right)$

$i = I_0 e^{-t/\tau}$

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

$\vec{F} = q\left(\vec{E} + \vec{v} \times \vec{B}\right)$

$\vec{F}_B = I\vec{L} \times \vec{B}$

$\vec{\mu} = NI\vec{A}$

$\vec{\tau} = \vec{\mu} \times \vec{B}$

$\vec{B} = \dfrac{\mu_0 I}{2\pi r}\vec{u}_\ell \times \vec{u}_r$

$\dfrac{F}{\ell} = \dfrac{\mu_0 I_1 I_2}{2\pi a}$

$\oint \vec{B} \cdot \mathrm{d}\vec{s} = \mu_0 I$

$B = \mu_0 nI$

$\Phi_B = \oint \vec{B} \cdot \mathrm{d}\vec{A}$

$\varepsilon = -N\dfrac{\mathrm{d}\Phi_B}{\mathrm{d}t}$

$LI = N\Phi_B$

$\varepsilon_L = -L\dfrac{\mathrm{d}I}{\mathrm{d}t}$

$U_B = \dfrac{1}{2}LI^2$

$\tau = L/R$

$i = I_0\left(1 - e^{-t/\tau}\right)$

$i = I_0 e^{-t/\tau}$

$i = I_{max}\sin(\omega t)$

$\Delta v = \Delta V_{max}\sin(\omega t + \phi)$

$\Delta V_{max} = ZI_{max}$

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$X_L = \omega L$

$X_C = \dfrac{1}{\omega C}$

$\phi = arctan\left(\dfrac{X_L - X_C}{R}\right)$

$I_{eff} = \dfrac{I_{max}}{\sqrt{2}}$

$\Delta V_{eff} = \dfrac{\Delta V_{max}}{\sqrt{2}}$

$P = RI_{eff}^2 = I_{eff}\Delta V_{eff}\cos\phi$

Vecteurs

$\vec{A} \cdot \vec{B} = A_xB_x + A_yB_y + A_zB_z = AB\cos\theta$

$\vec{A} \times \vec{B} = \left(A_yB_z - A_zB_y\right)\vec{\imath} + (A_zB_x - A_xB_z)\vec{\jmath} + \left(A_xB_y - A_yB_x\right)\vec{k}$