

cgs unit

$$4\pi \rho = \nabla \cdot E, \quad 4\pi \mu_0 = 1$$

$$\nabla \times E = -\frac{1}{c} \frac{\partial B}{\partial t}; \quad \nabla \times B = \frac{4\pi}{c} J + \frac{1}{c} \frac{\partial E}{\partial t}$$

$$F = q(E + \frac{v}{c} \times B); \quad F = \frac{q_1 q_2}{r^2}$$

$$E = -\nabla \phi - \frac{1}{c} \frac{\partial A}{\partial t}$$

Lorentz Transformation:  $S, S'$

$$E' = \gamma (E + \beta \times B) - \frac{\gamma^2}{\gamma+1} \beta (\beta \cdot E)$$

$$B' = \gamma (B - \beta \times E) - \frac{\gamma^2}{\gamma+1} \beta (\beta \cdot B)$$

Gaussian integration:  $\int_{-\infty}^{+\infty} e^{-x^2/a} dx = \sqrt{a\pi}$

$$\int_0^{+\infty} x \cdot e^{-x^2/a^2} dx = \frac{1}{2} a^2; \quad \int_0^{+\infty} x^2 \cdot e^{-x^2/a^2} dx = \sqrt{\pi} \cdot \frac{a^3}{4}$$

$\frac{a^3 \cdot 1}{2^2}$

Magnetic tension & pressure force

$$F_{\text{pressure}} = -\nabla \left( \frac{B^2}{2\mu_0} \right); \quad F_{\text{tension}} = \frac{1}{\mu_0} (B \cdot \nabla) B$$

$$B: \quad 1 \text{ Gauss} = 10^{-4} \text{ T}$$

Bessel equation (HW10)

名称	高斯单位制	国际单位制
电场、电势	$\mathbf{E}, \varphi$	$\sqrt{4\pi\epsilon_0}(\mathbf{E}, \varphi)$
电势移	$\mathbf{D}$	$\sqrt{4\pi/\epsilon_0}\mathbf{D}$
电荷、电荷密度、电流、电流密度、 电极化强度、电偶极矩	$q, \rho, I, \mathbf{j}, \mathbf{P}, \mathbf{p}$	$\frac{1}{\sqrt{4\pi\epsilon_0}}(q, \rho, I, \mathbf{j}, \mathbf{P}, \mathbf{p})$
磁感应强度、磁矢势	$\mathbf{B}, \mathbf{A}$	$\sqrt{4\pi/\mu_0}(\mathbf{B}, \mathbf{A})$
磁场强度	$\mathbf{H}$	$\sqrt{4\pi\mu_0}\mathbf{H}$
磁矩、磁化强度	$\mathbf{m}, \mathbf{M}$	$\sqrt{\mu_0/4\pi}(\mathbf{m}, \mathbf{M})$
电容率、磁导率	$\epsilon, \mu$	$(\epsilon/\epsilon_0, \mu/\mu_0)$
电极化率、磁化率	$\chi_e, \chi_m$	$\frac{1}{4\pi}(\chi_e, \chi_m)$
电导率、电导、电容	$\sigma, S, C$	$\frac{1}{4\pi\epsilon_0}(\sigma, S, C)$
电阻率、电阻、电感	$\rho, R, L$	$4\pi\epsilon_0(\rho, R, L)$

$$\int_0^\infty x^{2n} e^{-\frac{x^2}{a^2}} dx = \sqrt{\pi} \frac{a^{2n+1} (2n-1)!!}{2^{n+1}}$$

$$\int_0^\infty x^{2n+1} e^{-\frac{x^2}{a^2}} dx = \frac{n!}{2} a^{2n+2}$$