伯克利 磁学

$$c^2 = rac{1}{\mu_0 arepsilon_0}$$

• 安培环路定理

$$\iint m{B} \cdot \mathrm{d} s = \mu_0 I$$
 $m{
abla} imes m{B} = \mu_0 m{I}$
 $m{
abla} imes B = 0$

• 法拉第电磁感应定律

$$egin{aligned} \mathscr{E} &= -rac{\mathrm{d}\Phi}{\mathrm{d}t} \ oldsymbol{
abla} oldsymbol{
abla} imes oldsymbol{E} &= -rac{\partial oldsymbol{B}}{\partial t} \end{aligned}$$

• 能量

$$\begin{split} U &= \frac{1}{2}LI^2 = \frac{1}{2}\Psi I = \frac{\Psi^2}{2L} \\ &= \frac{1}{2}CV^2 = \frac{1}{2}QV = \frac{Q^2}{2C} \\ &= \iiint \frac{1}{2}\mu H^2 \, \mathrm{d}V = \iiint \frac{1}{2}BH \, \mathrm{d}V = \iiint \frac{B^2}{2\mu} \, \mathrm{d}V \\ &= \iiint \frac{1}{2}\varepsilon E^2 \, \mathrm{d}V = \iiint \frac{1}{2}ED \, \mathrm{d}V = \iiint \frac{D^2}{2\varepsilon} \, \mathrm{d}V \end{split}$$

• 串联 RLC 电路 (无电动势) 的环路方程

$$V(t) = e^{-\alpha t} (A\cos\omega t + B\sin\omega t)$$

 $\alpha = \frac{R}{2L}, \ \omega^2 = \frac{1}{LC} - \frac{R^2}{4L^2}$

• 若加入正弦电动势

$$egin{aligned} \mathscr{E}_t &= \mathscr{E}_0 \cos \omega t \ I_0 &= rac{\mathscr{E}_0}{\sqrt{R^2 + (\omega L - 1/\omega C)^2}} \ an \phi &= rac{1}{R\omega C} - rac{\omega L}{R} \end{aligned}$$

• 麦克斯韦方程组

$$egin{align} oldsymbol{
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abla} oldsymbol{E} oldsymbol{E} & oldsymbol{B} - oldsymbol{B} - oldsymbol{\partial} oldsymbol{E} & oldsymbol{\partial} oldsymbol{E} - oldsymbol{\partial} oldsymbol{\nabla} oldsymbol{\cdot} oldsymbol{B} & oldsymbol{\partial} olds$$

• 计算电动势

动生电动势:
$$\mathscr{E} = \int \boldsymbol{v} \times \boldsymbol{B} \cdot \mathrm{d} \boldsymbol{l}$$

• 电荷与电流受力

$$oldsymbol{F} = qoldsymbol{v} imes oldsymbol{B}$$