

Maxwell Equations

Gauss Law

$$\oint_S \mathbf{E} \cdot \hat{\mathbf{n}} \, dS = \frac{q}{\epsilon_0}$$

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0}$$

Gauss Law
of magnetism

$$\oint_S \mathbf{B} \cdot \hat{\mathbf{n}} \, dS = 0$$

$$\nabla \cdot \mathbf{B} = 0$$

Faraday's Law

$$\oint_l \mathbf{E} \cdot d\mathbf{l} = -\frac{d}{dt} \int_S \mathbf{B} \cdot \hat{\mathbf{n}} \, dS$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

Ampere-
Maxwell's Law

$$\oint_l \mathbf{E} \cdot d\mathbf{l} = \mu_0 \left(I + \epsilon_0 \frac{d}{dt} \int_S \mathbf{E} \cdot \hat{\mathbf{n}} \, dS \right)$$

$$\nabla \times \mathbf{B} = \mu_0 \left(\mathbf{J} + \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right)$$