Maxwell's equations

Integral form

Gauss's law	No magnetic monopoles
$\oint_{\text{CLOSED}} \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\mathbf{A}} = \dfrac{Q_{\text{ENCL}}}{\epsilon_0}$	$\oint_{\text{CLOSED}} \vec{\mathbf{B}} \cdot \mathrm{d}\vec{\mathbf{A}} = 0$
Faraday's law	**Ampère's law**
$\oint \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\boldsymbol{\ell}} = -\dfrac{\mathrm{d}}{\mathrm{d}t}\int \vec{\mathbf{B}} \cdot \mathrm{d}\vec{\mathbf{A}}$	$\oint \vec{\mathbf{B}} \cdot \mathrm{d}\vec{\boldsymbol{\ell}} = \mu_0 (I_{\text{THREAD}} + I_{\text{D}})$ $I_{\text{D}} := \epsilon_0 \dfrac{\mathrm{d}}{\mathrm{d}t}\int \vec{\mathbf{E}} \cdot \mathrm{d}\vec{\mathbf{A}}$

Differential form

Gauss's law	No magnetic monopoles
$\vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{E}} = \dfrac{\rho}{\epsilon_0}$	$\vec{\boldsymbol{\nabla}} \cdot \vec{\mathbf{B}} = 0$
Faraday's law	**Ampère's law**
$\vec{\boldsymbol{\nabla}} \times \vec{\mathbf{E}} = -\dfrac{\partial \vec{\mathbf{B}}}{\partial t}$	$\vec{\boldsymbol{\nabla}} \times \vec{\mathbf{B}} = \mu_0 \vec{\mathbf{J}} + \mu_0 \vec{\mathbf{J}}_{\text{D}}$ $\vec{\mathbf{J}}_D := \epsilon_0 \dfrac{\partial \vec{\mathbf{E}}}{\partial t}$

Electromagnetic waves

We can use Maxwell's equations in differential form to obtain

$$\vec{\boldsymbol{\nabla}}^2 \vec{\mathbf{E}} - \mu_0 \epsilon_0 \frac{\partial^2 \vec{\mathbf{E}}}{\partial t^2} = \vec{\mathbf{0}}$$

$$\vec{\boldsymbol{\nabla}}^2 \vec{\mathbf{B}} - \mu_0 \epsilon_0 \frac{\partial^2 \vec{\mathbf{B}}}{\partial t^2} = \vec{\mathbf{0}}$$

E-M waves propagate with speed

$$c = \frac{1}{\sqrt{\mu_0 \epsilon_0}} = 3.00 \times 10^8 \, \frac{\mathrm{m}}{\mathrm{s}}$$