

A10. Appendix 10: Maxwell's Equations

A10.1. Maxwell's differential equations for free space

$$\vec{\nabla} \cdot \vec{E} = \frac{r}{e} \quad (\text{A10.1.1})$$

$$\vec{\nabla} \cdot \vec{B} = 0 \quad (\text{A10.1.2})$$

$$\vec{\nabla} \times \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad (\text{A10.1.3})$$

$$\vec{\nabla} \times \vec{B} = m_0 \vec{J} + \frac{1}{c^2} \frac{\partial \vec{E}}{\partial t} \quad (\text{A10.1.4})$$

A10.2. Maxwell's integral equations for free space

$$\oint_S e_0 \vec{E} \cdot d\vec{s} = \iiint_V r \, dV \quad (\text{A10.2.1})$$

$$\oint_S \vec{B} \cdot d\vec{s} = 0 \quad (\text{A10.2.2})$$

$$\oint_L \vec{E} \cdot d\vec{l} = -\frac{d}{dt} \iint_S \vec{B} \cdot d\vec{s} \quad (\text{A10.2.3})$$

$$\oint_L \frac{\vec{B}}{km_0} \cdot d\vec{l} = \iint_S \vec{J} \cdot d\vec{s} + \frac{d}{dt} \iint_S e_0 \vec{E} \cdot d\vec{s} \quad (\text{A10.2.4})$$