PH-214 Cheat Sheet

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Constants

Maxwell's Equations

$$\oint \vec{E} \cdot d\vec{A} = \frac{q_{\text{enc}}}{\epsilon_0} \qquad \oint \vec{B} \cdot d\vec{A} = 0 \qquad \oint \vec{E} \cdot d\vec{s} = -\frac{d\phi_B}{dt} \qquad \oint \vec{B} \cdot d\vec{s} = \mu_0\epsilon_0\frac{d\phi_B}{dt} + \mu_0 i_{\text{enc}}$$

$$\nabla\cdot\vec{E} = 0 \qquad \nabla\cdot\vec{B} = 0 \qquad \nabla\times\vec{E} = -\frac{\partial\vec{B}}{\partial t} \qquad \nabla\times\vec{B} = \mu_0\epsilon_0\frac{\partial\vec{E}}{\partial t} \qquad \nabla^2\vec{B} = \mu_0\epsilon_0\frac{\partial^2\vec{B}}{\partial t^2} \qquad \nabla^2\vec{E} = \mu_0\epsilon_0\frac{\partial^2\vec{E}}{\partial t^2}$$

$$\frac{1}{c_0}\frac{\partial^2\vec{E}}{\partial t^2} = \nabla^2\vec{E} \qquad \frac{1}{c_0}\frac{\partial^2\vec{B}}{\partial t^2} = \nabla^2\vec{B} \qquad \vec{E} = \vec{E_0}e^{i(k\cdot r-\omega t)} \qquad \vec{B} = \vec{B_0}e^{i(k\cdot r-\omega t)} \qquad \mu_E = \frac{1}{2}\epsilon_0\left|\vec{E}\right|^2 \qquad \mu_B = \frac{1}{2\mu_0}\epsilon_0\left|\vec{B}\right|^2$$