Phys 273 - Formula Sheet #3

$$I = 4A^2\cos^2\left(\frac{\Delta\phi}{2}\right) = I_0\cos^2\left(\frac{\Delta\phi}{2}\right)$$

$$I = I_0\frac{\sin^2(\beta)}{\beta^2},\ \beta = \frac{1}{2}kb\sin(\theta)$$

$$I = I_0\frac{\sin^2(\beta)}{\beta^2}\cos^2(\alpha),\ \alpha = \frac{1}{2}ka\sin(\theta)$$

$$\oint_{surface} \vec{E}\cdot\hat{n}dA = \frac{Q_{enclosed}}{\varepsilon_0}$$

$$\oint_{surface} \vec{B}\cdot\hat{n}dA = 0$$

$$\oint_{curve} \vec{E}\cdot d\vec{\ell} = -\frac{d\varphi_M}{dt}$$

$$\oint_{curve} \vec{B}\cdot d\vec{\ell} = \mu_0 I + \mu_0\varepsilon_0\frac{d\phi_E}{dt}$$

$$\nabla\cdot\vec{E} = \frac{\rho}{\varepsilon_0}$$

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

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

$$\nabla\times\vec{B} = \mu_0\vec{J} + \mu_0\varepsilon_0\frac{\partial\vec{E}}{\partial t}$$

$$\int_{volume} (\nabla\cdot\vec{v})dV = \oint_{surface} \vec{v}\cdot\hat{n}\,da$$

$$\int_{surface} \left(\nabla\times\vec{v}\right)\cdot\hat{n}da = \oint_{curve} \vec{v}\cdot d\vec{\ell}$$

$$\nabla^2\vec{E} = \mu_0\varepsilon_0\frac{\partial^2\vec{E}}{\partial t^2}, \nabla^2\vec{B} = \mu_0\varepsilon_0\frac{\partial^2\vec{B}}{\partial t^2},\ v_{phase} = \frac{1}{\sqrt{\mu_0\varepsilon_0}}$$

$$\vec{E}(z,t) = \vec{E}_0 e^{i(kz-\omega t)}, \vec{B}(z,t) = \vec{B}_0 e^{i(kz-\omega t)},\ \vec{E}\cdot\vec{B} = 0, \vec{E}\cdot\hat{z} = 0, \vec{B}\cdot\hat{z} = 0,\ \left|\vec{E}_0\right| = c\left|\vec{B}_0\right|$$

$$u_{total} = \varepsilon_0\left|\vec{E}\right|^2,\ \vec{S} = \frac{1}{\mu_0}\vec{E}\times\vec{B},\ \left\langle\left|\vec{S}\right|\right\rangle = I = \left\langle\left|\vec{S}\right|\right\rangle = I = \frac{1}{2}\varepsilon_0 c\left|\vec{E}_0^2\right|$$

$$\nabla^2\vec{E} = \mu\varepsilon\frac{\partial^2\vec{E}}{\partial t^2}, \nabla^2\vec{B} = \mu\varepsilon\frac{\partial^2\vec{B}}{\partial t^2},\ v_p = \frac{1}{\sqrt{\mu\varepsilon}}$$

$$\vec{S} = \frac{1}{\mu}\vec{E}\times\vec{B},\quad Z \equiv \sqrt{\frac{\varepsilon}{\mu}},\quad E_{0R} = \left(\frac{Z_2 - Z_1}{Z_2 + Z_1}\right)E_{0I},\quad E_{0R} = \left(\frac{2Z_2}{Z_2 + Z_1}\right)E_{0I}$$

$$I_{reflected} = \left(\frac{n_1 - n_2}{n_2 + n_1}\right)^2 I_{incident}$$