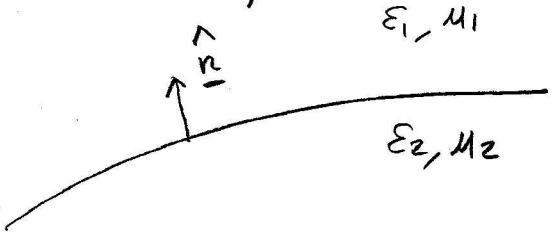
고급전자기학 I

1. Boundary conditions



$$\hat{n} \times (\underline{E}_1 - \underline{E}_2) = 0$$

$$\hat{n} \cdot (\underline{D}_1 - \underline{D}_2) = \rho_s$$

$$\hat{n} \times (\underline{H}_1 - \underline{H}_2) = \underline{J}$$

$$\hat{n} \cdot (\underline{B}_1 - \underline{B}_2) = 0$$

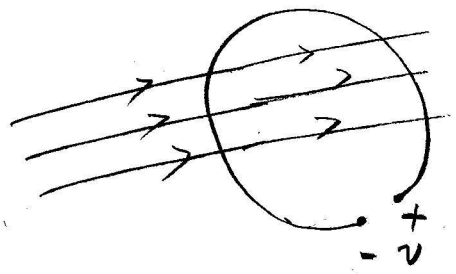
2. Planewave

$$S = E_{rms} H_{rms} = \frac{E_{rms}^2}{\eta}$$

$$E_{rms} = \sqrt{\eta S} = \sqrt{10^{-4} \times 377} = 0.194 \text{ Vrms/m}$$

$$H_{rms} = \frac{E_{rms}}{\eta} = \frac{0.194}{377} = 5.2 \text{ mArms/m}$$

3. Magnetic Induction



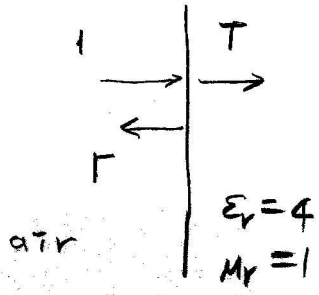
$$v = -\frac{d\lambda}{dt}$$

$$\lambda = N\Phi$$

$$\Phi = \int \underline{B} \cdot d\underline{s}$$

Time-varying magnetic flux induces an emf (electromotive force) on a loop that encloses the magnetic flux.

4.



$$\eta = \frac{\eta_0}{\sqrt{\varepsilon_r}}$$

$$\Gamma = \frac{\eta_2 - \eta_1}{\eta_2 - \eta_1} = \frac{\eta_0/\sqrt{\varepsilon_r} - \eta_0}{\eta_0/\sqrt{\varepsilon_r} + \eta_0} = \frac{1 - \sqrt{\varepsilon_r}}{1 + \sqrt{\varepsilon_r}} = \frac{1 - \sqrt{4}}{1 + \sqrt{4}} = -\frac{1}{3}$$

$$T = 1 + \Gamma = \frac{2}{3}$$