Physics 8.03
Vibrations and Waves

Lecture 13

Plane polarized EM waves

Last time: EM waves

- Maxwell's equations
  - Gauss's law
  - Faraday's law
  - Ampere's law (+ displacement current)
  - No magnetic monopoles
- In free space (vacuum) ➔ EM wave equation
- Solutions to EM wave equation

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

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

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

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

$$\nabla^2 \vec{E} = \frac{1}{c^2} \frac{\partial^2 \vec{E}}{\partial t^2}$$

$$\vec{E}(\vec{r},t) = \vec{E}_0 e^{j(\vec{k}.\vec{r}-\omega t)}$$

Polarization

- Components of E_0
- Energy carried by EM waves
- Polarizers