PHYS 1444 – Section 003
Lecture #23

Monday, Nov. 28, 2005
Dr. Jaehoon Yu

- EM Waves from Maxwell's Equations
- Speed of EM Waves
- Light as EM Wave
- Electromagnetic Spectrum
- Energy in EM Waves
- Energy Transport
- The epilogue

Today's homework is homework #12, noon, next Tuesday, Dec. 6!!

Announcements

- Reading assignments
  - CH. 32 – 8 and 32 – 9
- No class this Wednesday, Nov. 30
- Final term exam
  - Time: 11am – 12:30pm, Monday Dec. 5
  - Location: SH103
  - Covers: CH 29.3 – CH32
  - Please do not miss the exam
  - Two best of the three exams will be used for your grades

Maxwell's Equations

- In the absence of dielectric or magnetic materials, the four equations developed by Maxwell are:

$$\oint \vec{E} \cdot d\vec{A} = \frac{Q_{encl}}{\varepsilon_0}$$

Gauss' Law for electricity

A generalized form of Coulomb's law relating electric field to its sources, the electric charge

$$\oint \vec{B} \cdot d\vec{A} = 0$$

Gauss' Law for magnetism

A magnetic equivalent ff Coulomb's law relating magnetic field to its sources. This says there are no magnetic monopoles.

$$\oint \vec{E} \cdot d\vec{l} = -\frac{d\Phi_B}{dt}$$

Faraday's Law

An electric field is produced by a changing magnetic field

$$\oint \vec{B} \cdot d\vec{l} = \mu_0 I_{encl} + \mu_0 \varepsilon_0 \frac{d\Phi_E}{dt}$$

Ampére's Law

A magnetic field is produced by an electric current or by a changing electric field