

Surf's up, Maxwell!

6.632 Electromagnetic Wave Theory (Spring 2008)

Prereq: 6.630 or 6.013 or 8.07

Units: 3-0-9 H-Level Grad Credit

Lecturer: Prof. J. A. Kong

Textbook: J. A. Kong, "*Electromagnetic Wave Theory*", EMW Publishing, 2005



6.632 is a follow-up class to its prerequisites, 6.013 or 6.630 or 8.07. It's also open to those who are interested in electromagnetics. The class covers electromagnetic wave theory and some applications, emphasizing problem solving, and physical interpretation.

Outline of major topics

Waves in Media: Constitutive Relation; Time-average Poynting Power Vector; Plane Wave Solutions; Phase Velocity and Group Velocity; kDB System; Plane Waves in Uniaxial Media; Plane Waves in Gyrotropic Media; Plane Waves in Bianisotropic Media.

Phase Matching and Guidance: Phase Matching; Reflection and Transmission at a Plane Boundary; Reflection and Transmission by a Layered Medium; Guidance by Conducting Parallel Plates; Cylindrical Rectangular Waveguide; Cylindrical Circular Waveguide; Resonance.

Radiation: Cerenkov Radiation; Dyadic Green's Functions; Radiation Field Approximation; Hertzian Electric Dipole; Hertzian Magnetic Dipole; Antenna Array.

Theorems of Waves and Media: Equivalence Principle; Extinction Theory; Duality and complementarity; Huygens' Principle; Fresnel and Fraunhofer Diffraction; Reaction and Reciprocity; Quantization of Electromagnetic Waves.

"Prof. Kong says that this course explains the universe and it really does!"

---from 2006 HKN evaluation

