EEM 323
ELECTROMAGNETIC WAVE THEORY II

REVIEW
ELECTROMAGNETIC WAVE THEORY I

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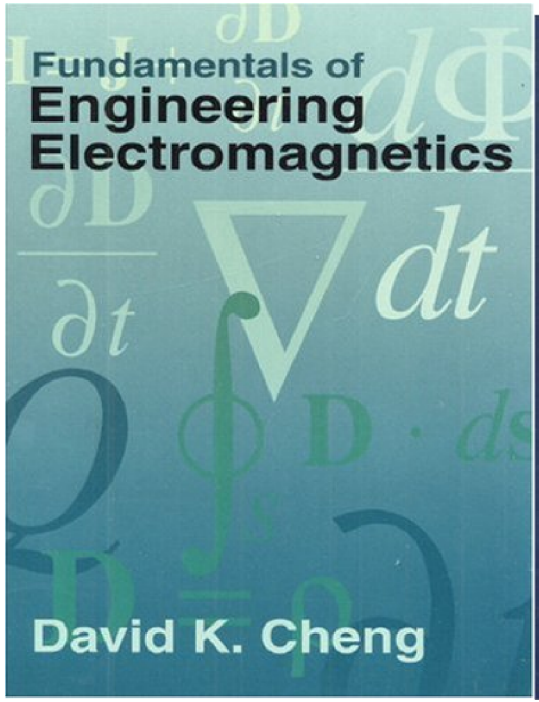
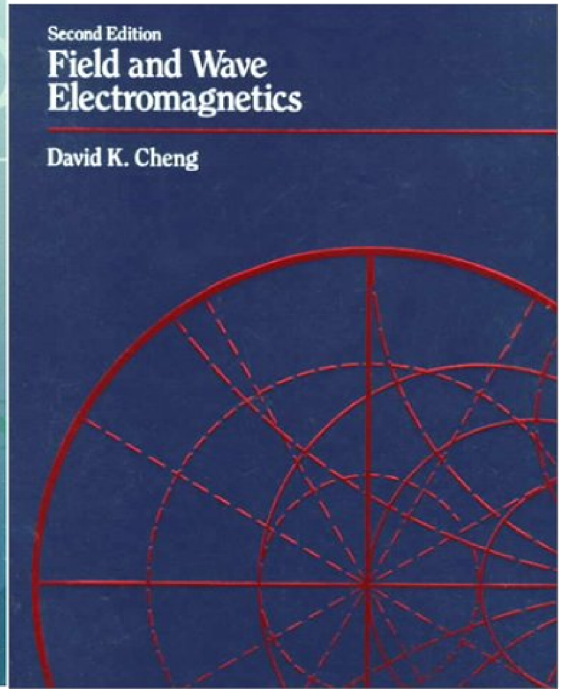
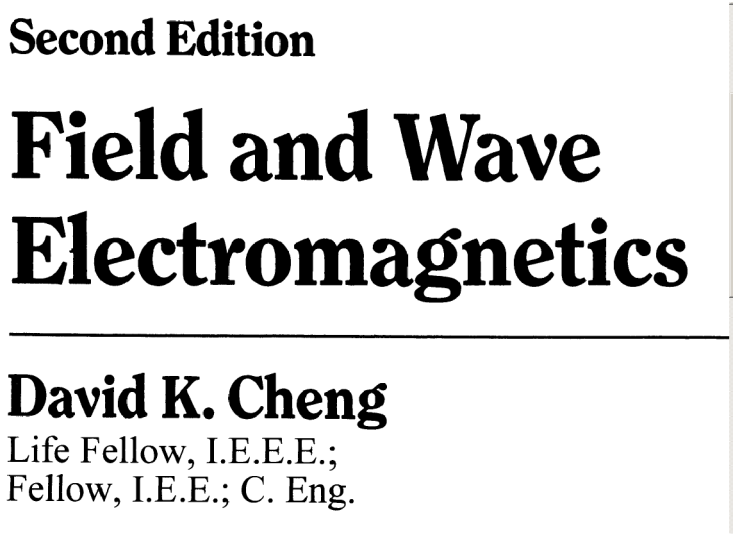
REVIEW OF ELECTROMAGNETIC WAVE THEORY I

EEM224

We will review 'Static E and H Fields' in this lecture:







SOURCES FOR ELECTRIC FIELD

2

Vector Analysis

Vector addition, subtraction, ...

Vector Cross Product

Product of Three Vectors

Orthogonal Coordinate Systems

- **Caartesian**
- **Cylindrical**
- **Spherical**

Vector and scalar integrals

Gradient of a scalar field

Divergence of a vector field, Flux

Curl of a vector field

3

Static Electric Fields

Charles-Augustin de Coulomb (1736 – 1806)

ELECTRIC FORCE

COULOMB'S LAW

GAUSS'S LAW AND APPLICATIONS:

Carl Friedrich Gauss (1777-1855)

ELECTRIC POTENTIAL:

CONDUCTORS IN STATIC ELECTRIC FIELD

DIELECTRICS IN STATIC ELECTRIC FIELD

EQUIVALENT CHARGE DISTRIBUTIONS OF POLARIZED DIELECTRICS

ELECTRIC FLUX DENSITY (D)

DIELECTRIC CONSTANT

BOUNDARY CONDITIONS FOR ELECTROSTATIC FIELDS

CAPACITANCE AND CAPACITORS

ELECTROSTATIC ENERGY AND FORCES

ELECTROSTATIC FIELDS

TORQUE:

4

Solution of Electrostatic Problems

LAPLACE'S EQUATION

POISSON'S EQUATION

Pierre-Simon Laplace (1749-1827) **Siméon Poisson (1781-1840)**

METHOD OF IMAGES

BOUNDARY – VALUE PROBLEMS

5

Steady Electric Currents

CURRENT DENSITY

OHM'S LAW

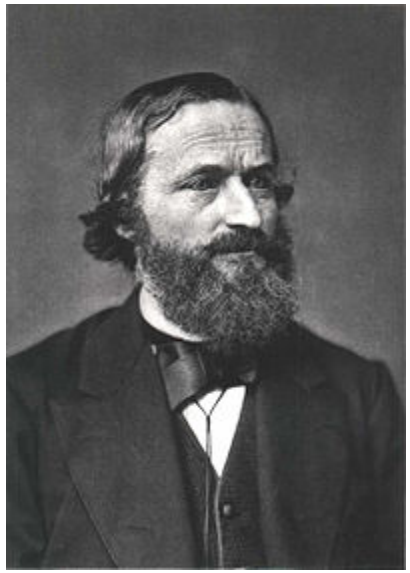
Georg Simon Ohm (1789-1854)

OHM'S LAW

RESISTANCE

ELECTROMOTIVE FORCE

KIRCHOFF'S VOLTAGE AND CURRENT LAW



Gustav Kirchhoff (1824-1887)

James Prescott Joule (1818-1889)

POWER DISSIPATION, JOULE'S LAW

BOUNDARY CONDITIONS FOR CURRENT DENSITY

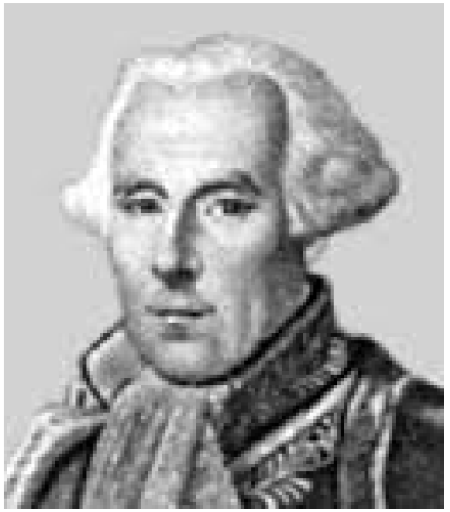
RESISTANCE CALCULATIONS

6

Static Magnetic Fields

VECTOR MAGNETIC POTENTIAL

Jean-Baptiste Biot (1774-1862)



Félix Savart (1791-1841)

BIOT – SAVART LAW AND APPLICATIONS

MAGNETIC DIPOLE

SCALAR MAGNETIC POTENTIAL

MAGNETIZATION AND EQUIVALENT CURRENT DENSITIES

EQUIVALENT MAGNETIZATION CHARGE DENSITIES

MAGNETIC FIELD INTENSITY, RELATIVE PERMEABILITY

ANALOGOUS RELATIONS

MAGNETIC CIRCUITS

BEHAVIOR OF MAGNETIC MATERIALS

BOUNDARY CONDITIONS FOR MAGNETOSTATIC FIELDS

INDUCTANCE AND INDUCTORS

MAGNETIC ENERGY

André-Marie Ampère (1775-1836)

MAGNETIC FORCE

MAGNETIC FORCE