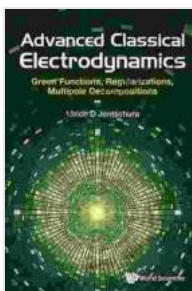


Advanced Classical Electrodynamics: Green Functions, Regularizations, and Multipoles

Classical electrodynamics is a fundamental branch of physics that describes the interactions of charged particles and electromagnetic fields. It is a vast and complex subject, with applications in many areas of science and engineering, including optics, electronics, and materials science.

This book provides a comprehensive and advanced treatment of classical electrodynamics, with a focus on Green functions, regularization techniques, and multipolar expansions. It is suitable for graduate students and researchers in electromagnetism, optics, and related fields.

The book begins with a review of the basic concepts of classical electrodynamics, including Coulomb's law, Gauss's law, Faraday's law, and Ampère's law. It then introduces the concept of Green functions, which are used to solve a wide variety of problems in electromagnetism.



Advanced Classical Electrodynamics: Green Functions, Regularizations, Multipole Decompositions

by Dmitry Vostokov

★★★★☆ 4.5 out of 5

Language : English
File size : 61444 KB
Text-to-Speech : Enabled
Screen Reader : Supported
Enhanced typesetting : Enabled
Print length : 370 pages
X-Ray for textbooks : Enabled



The book also discusses regularization techniques, which are used to remove divergences from Green functions. These techniques include the Pauli-Villars regularization, the dimensional regularization, and the heat kernel regularization.

Finally, the book introduces multipolar expansions, which are used to represent the electromagnetic fields of localized sources. These expansions are useful for a variety of applications, including the calculation of scattering cross sections and the design of antennas.

2. Basic Concepts of Classical Electrodynamics
3. Green Functions
4. Regularization Techniques
5. Multipolar Expansions
6. Applications

The following is a sample chapter from the book:

2. Basic Concepts of Classical Electrodynamics

In this chapter, we review the basic concepts of classical electrodynamics, including Coulomb's law, Gauss's law, Faraday's law, and Ampère's law.

Coulomb's Law

Coulomb's law states that the force between two point charges is directly proportional to the product of the charges and inversely proportional to the square of the distance between them. The force is attractive if the charges have opposite signs and repulsive if the charges have the same sign.

Gauss's Law

Gauss's law states that the electric flux through any closed surface is proportional to the total charge enclosed by the surface. The electric flux is a measure of the amount of electric field that passes through the surface.

Faraday's Law

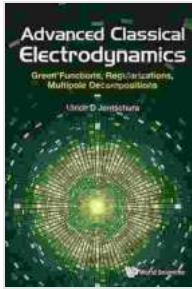
Faraday's law states that the electromotive force (EMF) around any closed loop is equal to the negative of the rate of change of the magnetic flux through the loop. The EMF is a measure of the voltage that is induced in the loop.

Ampère's Law

Ampère's law states that the magnetic field around any closed loop is proportional to the current flowing through the loop. The magnetic field is a measure of the strength of the magnetic field.

These four laws are the foundation of classical electrodynamics. They can be used to solve a wide variety of problems in electromagnetism, including the calculation of electric and magnetic fields, the design of antennas, and the analysis of electromagnetic waves.

This book provides a comprehensive and advanced treatment of classical electrodynamics, with a focus on Green functions, regularization techniques, and multipolar expansions. It is suitable for graduate students and researchers in electromagnetism, optics, and related fields.

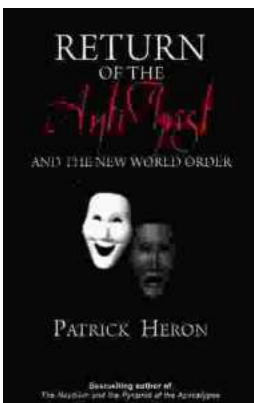


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