Foundations of Classical and Quantum Electrodynamics

Description: This advanced textbook differs from other books on electrodynamics as many fundamental, traditional and new branches of science are being analyzed on the basis of both classical and quantum approaches. The joint statement of classical and quantum electrodynamics allows the reader to get a more organic, adequate, and multidimensional picture of the physical phenomena.

The book, oriented towards 3rd  4th year bachelor, Master, and PhD students, introduces the material at different levels, and describes the whole complexity of physical phenomena instead of a mosaic of disconnected data. The required mathematical background is collated in Chapter 1, while the necessary physical background is included in the main text of the corresponding chapters and also given in appendices.

The content is based on teaching material tested on students over many years, and their training to apply general theory for solving scientific and engineering problems. To this aim, the book contains approximately 800 examples and problems.

The Mathematical Methods of Electrodynamics

Basic Concepts of Electrodynamics: The Maxwell Equations

The Special Theory of Relativity and Relativistic Kinematics

Fundamentals of Relativistic Mechanics and Field Theory

Emission and Scattering of Electromagnetic Waves

Quantum Theory of Radiation Processes. Photon Emission and Scattering

Fundamentals of Quantum Theory of the Electron  Positron Field

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