

Light-Matter Interactions Towards the Nanoscale

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The investigation of light-matter interactions in materials, especially those on the nanoscale, represents perhaps the most promising avenue for scientific progress in the fields of photonics and plasmonics. This book examines a variety of topics, starting from fundamental principles, leading to the current state of the art research. For example, this volume includes a chapter on the sensing of biological molecules with optical resonators (microspheres) combined with plasmonic systems, where the response of this system is described in a fundamental and elegant manner using coupled mode theory. Symmetry plays a major role in the book. One chapter on time reversal symmetry in electromagnetic theory describes how to control the properties of light (e.g. scattering and directionality of the flow of light) in materials with certain topological invariants. Another chapter reformulates, using a gentle and pedagogical approach, Maxwell's Equations into a new set of fields that reveal a "handedness" symmetry in electromagnetic theory, which can be applied to photonic systems in, for example, the sensing of chiral molecules and understanding the conditions for zero reflection. Also, for students and researchers starting in the field of nanoplasmonics, the book includes a tutorial on the finite element time domain simulation of nanoplasmonic systems. Other topics include photonic systems for quantum computing, nanoplasmonics, and optical properties of nano and bulk materials. The authors take a pedagogical approach to their topic, making the book an excellent reference for graduate students and scientists starting in the fields of photonics or plasmonics.

Słowa kluczowe

Computer Science, Conference Proceedings, Light-Matter Interactions, Symmetry and Topology, Photonic Resonators, Coupled Mode Theory

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