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Chapter 3. Quantum-Mechanical Theory of the Nonlinear Optical Susceptibility 3.1. Introduction; 3.2. Schrodinger Calculation of Nonlinear Optical Susceptibility; 3.3. Density Matrix Formulation of Quantum Mechanics; 3.4. Perturbation Solution of the Density Matrix Equation of Motion; 3.5. Density Matrix Calculation of the Linear Susceptibility; 3.6. Density Matrix Calculation of the Second-Order Susceptibility; 3.7. Density Matrix Calculation of the Third-Order Susceptibility; 3.8. Electromagnetically Induced Transparency; 3.9. Local-Field Corrections to the Nonlinear Optical Susceptibility Problems References; Chapter 4. The Intensity-Dependent Refractive Index; 4.1. Descriptions of the Intensity-Dependent Refractive Index; 4.2. Tensor Nature of the Third-Order Susceptibility; 4.3. Nonresonant Electronic Nonlinearities; 4.4. Nonlinearities Due to Molecular Orientation; 4.5. Thermal Nonlinear Optical Effects; 4.6. Semiconductor Nonlinearities; 4.7. Concluding Remarks; References; Chapter 5. Molecular Origin of the Nonlinear Optical Response; 5.1. Nonlinear Susceptibilities Calculated Using Time-Independent Perturbation Theory 5.2. Semiempirical Models of the Nonlinear Optical Susceptibility Model of Boling, Glass, and Owyong; 5.3. Nonlinear Optical Properties of Conjugated Polymers; 5.4. Bond-Charge Model of Nonlinear Optical Properties; 5.5. Nonlinear Optics of Chiral Media; 5.6. Nonlinear Optics of Liquid Crystals; Problems; References; Chapter 6. Nonlinear Optics in the Two-Level Approximation; 6.1. Introduction; 6.2. Density Matrix Equations of Motion for a Two-Level Atom; 6.3. Steady-State Response of a Two-Level Atom to a Monochromatic Field; 6.4. Optical Bloch Equations 6.5. Rabi Oscillations and Dressed Atomic States

Sommario/riassunto

Nonlinear optics is the study of the interaction of intense laser light with matter. The third edition of this textbook has been rewritten to conform to the standard SI system of units and includes comprehensively updated material on the latest developments in the field. The book presents an introduction to the entire field of optical physics and specifically the area of nonlinear optics, covering fundamental issues and applied aspects of this exciting area. Nonlinear Optics will have lasting appeal to a wide audience of physics, optics, and electrical engineering students, as we