1. Record Nr. UNISA996204372603316 Autore Murti YVGS Titolo Essentials of nonlinear optics // Prof. YVGS Murti & Dr. C. Vijayan Pubbl/distr/stampa New Delhi, India:,: Ane Books Pvt. Ltd.,, 2014 ©2014 **ISBN** 1-118-90234-3 1-118-90233-5 1-118-90107-X Descrizione fisica 1 online resource (205 p.) Collana Ane/Athena Books 621.3692 Disciplina Soggetti Fiber optics Nonlinear optics Optical communications Optical fiber communication - Equipment and supplies Lingua di pubblicazione Inglese **Formato** Materiale a stampa Livello bibliografico Monografia Description based upon print version of record. Note generali Nota di bibliografia Includes bibliographical references and index. Nota di contenuto Cover: Title Page: Copyright: Preface: Contents: List of Figures: Chapter 1: From Optics to Photonics: 1.1 The Charm and Challenge of Photonics: 1.2 The Nature of Optical Nonlinearity: 1.3 Overcoming the Materials Bottleneck; 1.4 The Expanding Frontiers; 1.5 Explorations; Chapter 2: A Phenomenological View of Nonlinear Optics: 2.1 Optics in the Nonlinear World; 2.1.1 Introduction; 2.1.2 First Order Susceptibility; 2.1.3 Second Order Susceptibility; 2.1.4 Third Order Susceptibility; 2.2 Time Domain Response; 2.2.1 First Order Polarization- Time Domain Response 2.2.2 Higher Order Polarizations - Time Domain Response2.3 Frequency Domain Response; 2.3.1 First Order Susceptibility; 2.3.2 Second Order Susceptibility; 2.3.3 General Order (n) Susceptibility; 2.4 The nth order Polarization; 2.5 Monochromatic Waves; 2.6 Calculation of the Factor K; 2.6.1 Optical Rectification; 2.6.2 Second Harmonic Generation; 2.6.3 Pockels Effect; 2.6.4 Sum and Difference Frequency generation; 2.6.5 Third Harmonic Generation; 2.6.6 Nondegenerate

Four Wave Mixing; 2.7 Explorations; Chapter 3: Symmetry and

Susceptibility Tensors; 3.1 Introduction

3.2 Crystal Symmetry and Susceptibility Tensors3.2.1 Neumann Principle: 3.2.2 Symmetry of Second Order Susceptibility: 3.2.3 Second Harmonic Generation; 3.2.4 Kleinman Symmetry; 3.2.5 Symmetry of Third Order Susceptibility; 3.3 The Dielectric Permittivity Tensor; 3.4 The Refractive Index Ellipsoid; 3.5 Explorations; Chapter 4: Calculation of Non-linear Susceptibilities; 4.1 Introduction; 4.1.1 Physical Quantities in Quantum Physics; 4.1.2 The Projection Operator; 4.2 The Equation of Motion; 4.3 Ensembles of Particles; 4.4 Time-dependent Perturbation: 4.5 Dipolar Interaction 4.6 First Order Density Matrix4.7 Second Order Density Matrix; 4.8 Third Order Density Matrix; 4.9 Double Integrals in the Expressions for Density Matrix; 4.10 Second Harmonic Susceptibility; 4.11 Relaxation Effects; 4.12 Applications to Color Centers; 4.12.1 Third Order Susceptibility; 4.12.2 Second Order Susceptibility; 4.13 Explorations; Chapter 5: Nonlinear Wave Mixing Processes: 5.1 Introduction: 5.2 Elements of Electromagnetism; 5.3 Travelling Electromagnetic Waves in Free Space; 5.3.1 Energy Density in the Travelling Wave; 5.4 Propagation of Electromagnetic Waves in Linear Materials 5.5 Propagation of Electromagnetic Waves in Nonlinear Materials 5.5.1 The Wave Equation; 5.5.2 Energy Transfer Rate; 5.6 Three Wave Mixing; 5.6.1 An Approximation; 5.7 Second Harmonic Generation; 5.7.1 Phase Matching Schemes: 5.7.2 Accurate Treatment of Second Harmonic Generation; 5.8 Explorations; Chapter 6: Optical Phase Conjugation and Bistability: 6.1 Optical Phase Conjugation: 6.1.1 Phase Conjugation as Time Reversal; 6.1.2 Phase Conjugation through Four-Wave-Mixing; 6.1.3 Practical Realization; 6.1.4 Peculiar Properties of the Phase Conjugate Beam: 6.1.5 The Grating Picture 6.1.6 Applications of Phase Conjugation

## Sommario/riassunto

Current literature on Nonlinear Optics varies widely in terms of content, style, and coverage of specific topics, relative emphasis of areas and the depth of treatment. While most of these books are excellent resources for the researchers, there is a strong need for books appropriate for presenting the subject at the undergraduate or postgraduate levels in Universities. The need for such a book to serve as a textbook at the level of the bachelors and masters courses was felt by the authors while teaching courses on nonlinear optics to students of both science and engineering during the past tw