

Preface

Nonlinear optics is a revolutionary extension of conventional (linear) optics promoted by laser technology. The main subject of nonlinear optics is the study of various effects and phenomena related to the interaction of intense coherent light with matter. A number of books on this topic have been published in the past. Some of them emphasize theoretical descriptions and mathematical formulations, whereas others emphasize technical aspects or experimental results.

This book is written based on the progress and achievements of nonlinear optics over the past forty-years. Within the same time-period, the authors have conducted fundamental research in the field of quantum electronics and published several books on nonlinear optics, laser physics, and laser devices.

This book focuses on both theoretical and experimental descriptions of various nonlinear optical effects and phenomena. Specifically, each chapter or each major section is composed of the following four basic parts: (1) Conceptual discussions and explanations of mechanisms; (2) Rigorous and concise mathematical formulation; (3) Typical experimental behavior and techniques; and (4) Up-to-date research achievements and applications.

In nonlinear optics and related areas, there are a tremendous number of published papers and conference presentations from the past four decades. However, only a very limited number of papers are cited in this book, based on the following three criteria: (i) original papers with the significance of novelty or innovation, (ii) earlier studies establishing basic understanding of the effects or phenomena, (iii) selected examples from a large number of similar studies. Although it is our desire to include all related papers of importance, due to the scope and size of this book, some of them are not cited. We would like to apologize for this.

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The International System of Units (SI) is used throughout this book for all formulations.

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