



Nonlinear Optics: Phenomena, Materials and Devices

George I. Stegeman, Robert A. Stegeman

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Clear, integrated coverage of all aspects of nonlinear optics—phenomena, materials, and devices

Coauthored by George Stegeman, one of the most highly respected pioneers of nonlinear optics—with contributions on applications from Robert Stegeman—this book covers nonlinear optics from a combined physics, optics, materials science, and devices perspective. It offers a thoroughly balanced treatment of concepts, nonlinear materials, practical aspects of nonlinear devices, and current application areas.

Beginning with the presentation of a simple electron on a spring model—to help readers make the leap from concepts to applications—*Nonlinear Optics* gives comprehensive explanations of second-order phenomena, derivation of nonlinear susceptibilities, third-order nonlinear effects, multi-wave mixing, scattering, and more. Coverage includes:

- Nonlinear response of materials at the molecular level
- Second-order nonlinear devices, their optimization and limitations
- The physical origins of second- and third-order nonlinearities
- Typical frequency dispersion of nonlinearities, explained in terms of simple two- and three-level models
- Ultrafast and ultrahigh intensity processes
- Practice problems demonstrating the design of such nonlinear devices as frequency doublers and optical oscillators

Based on more than twenty years of lectures at the College of Optics and Photonics (CREOL) at the University of Central Florida, *Nonlinear Optics* introduces all topics from the ground up, making the material easily accessible not only for physicists, but also for chemists and materials scientists, as well as professionals in diverse areas of optics, from laser physics to electrical engineering.

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