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Nonlinear Optics

Basic Concepts

1991. VIII, 184 pp. 32 figs.
Hardcover DM 59,- ISBN 3-540-54192-6

The text presents the key concepts in nonlinear optics at a level that will also be accessible to the non-specialist who wishes to acquire a foundation in the field. The principal equations of nonlinear physics are also encountered (Sine Gordon equation, nonlinear Schrödinger equation), and their soliton solutions examined and related to nonlinear optics. The final chapter addresses the chaotic response of nonlinear systems. The book will appeal to graduate students in physics, physical chemistry and electronic engineering.

The major topics include principles of the linear and nonlinear dielectric response of matter, second-harmonic generation, four-wave mixing, and the inelastic scattering of light from matter, with attention also given to stimulated scattering. The highly nonlinear response of nearly resonant two-level systems is discussed, also in relation to saturation and self-induced transparency. Guided waves in optical fibers are explored, including the propagation of soliton pulses. The nonlinear optical response of periodic structures is examined as well.

This book is addressed to a broad audience interested in a thorough discussion of basic concepts. It facilitates access to the research literature, and will prepare the reader to tackle more advanced texts.

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tm.30.308/V/2h

CHINESE JOURNAL OF LASERS

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Volume 19 · No. 4 · April 1992

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