Nonlinear Waves in Integrable and Non-integrable Systems (Monographs on Mathematical Modeling and Computation)

Jianke Yang

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This book presents cutting-edge developments in the theory and experiments of nonlinear waves. Its comprehensive coverage of analytical methods for nonintegrable systems is the first of its kind. It also covers in great depth analytical methods for integrable equations, and comprehensively describes efficient numerical methods for all major aspects of nonlinear wave computations.

In addition, the book presents the latest experiments on nonlinear waves in optical systems and Bose-Einstein condensates, especially in periodic media. The book contains a large number of simple and efficient MATLAB codes for various nonlinear wave computations, which readers can easily adapt to solve their own problems. The codes can also be found on an associated Web page.

Audience: This book is intended for researchers and graduate students working in applied mathematics and various physical subjects, such as nonlinear optics, Bose Einstein condensates, and fluid dynamics, where nonlinear wave phenomena arise.

Contents: List of Figures; Preface; Chapter 1. Derivation of nonlinear wave equations; Chapter 2. Integrable theory for the nonlinear Schrödinger equation; Chapter 3. Theories for integrable equations with higher-order scattering operators; Chapter 4. Soliton perturbation theories and applications; Chapter 5. Theories for nonintegrable equations; Chapter 6. Nonlinear wave phenomena in periodic media; Chapter 7. Numerical methods for nonlinear wave equations; Bibliography; Index.

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