

New Approaches to Nonlinear Waves

The book details a few of the novel methods developed in the last few years for studying various aspects of nonlinear wave systems. The introductory chapter provides a general overview, thematically linking the objects described in the book.

Two chapters are devoted to wave systems possessing resonances with linear frequencies (Chapter 2) and with nonlinear frequencies (Chapter 3).

In the next two chapters modulation instability in the KdV-type of equations is studied using rigorous mathematical methods (Chapter 4) and its possible connection to freak waves is investigated (Chapter 5).

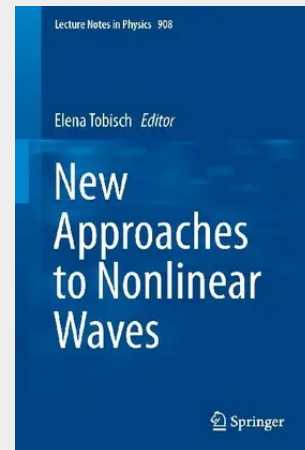
The book goes on to demonstrate how the choice of the Hamiltonian (Chapter 6) or the Lagrangian (Chapter 7) framework allows us to gain a deeper insight into the properties of a specific wave system.

The final chapter discusses problems encountered when attempting to verify the theoretical predictions using numerical or laboratory experiments.

All the chapters are illustrated by ample constructive examples demonstrating the applicability of these novel methods and approaches to a wide class of evolutionary dispersive PDEs, e.g. equations from Benjamin-Oro, Boussinesq, Hasegawa-Mima, KdV-type, Klein-Gordon, NLS-type, Serre, Shamel, Whitham and Zakharov.

This makes the book interesting for professionals in the fields of nonlinear physics, applied mathematics and fluid mechanics as well as students who are studying these subjects. The book can also be used as a basis for a one-semester lecture course in applied mathematics or mathematical physics.

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