

many examples of interest. Chapters on classification of similarity rules, and transformation groups, complete the framework. Within it the author applies the ideas he has developed to areas as diverse as gas-dynamic waves, deformation and fracture of solids, turbulence and geophysical fluid dynamics. Anyone wishing to explore the opportunities offered by dimensional analysis and self-similarity will do no better than make Barenblatt's book a starting point. And not least because of the window it opens on the vast Russian literature in this area.

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***Structure and Dynamics of Nonlinear Waves in Fluids***, Advanced Series in Nonlinear Dynamics, edited by **A. Mielke, K. Kirchgässner** (World Scientific Publishing Co., London, 1995, 418 pp.) GB£ 66.00 hc ISBN 981 02 2124 X

The book stems from a IUTAM-ISIMM Symposium which was held in Hannover, August 17-20, 1994. (IUTAM stands for International Union of Theoretical and Applied Mechanics, while ISIMM stands for International Society of Interactions of Mechanics and Mathematics). The book contains 41 articles, divided into two parts: Part One – Invited Papers and Part Two – Contributed Papers. Although the distinction between Mathematics and Mechanics is not always easy to define, one can say that there are roughly 16 articles with a mathematical flavor and 25 with a mechanical flavor. Therefore the balance between mathematics and mechanics is pretty good.

When one opens the book and looks at the table of contents, one is struck by the large variety of topics which are treated in this book.

The authors state in the preface that all the papers have been refereed. Obviously this refereeing process has been done with care and one must thank the scientific committee for their job. Of course one cannot be an expert in all fields but I can say that the majority of the papers which are close to my field are of excellent quality (and several of them would have been quite appropriate for the *European Journal of Mechanics/B Fluids*!). Moreover, most of the papers present results that one cannot find somewhere else. It is clear that the contributors made a special effort to present new results, and not just results to appear elsewhere.

Let us now consider in more detail some of the topics which are treated in the various articles.

As one can imagine, all kinds of waves are considered: periodic waves (travelling or standing), solitary waves, fronts, quasi-periodic waves. For all these kinds of waves, there are papers emphasizing the bifurcation aspect while some papers emphasize the stability aspect. These papers deal either with the full Euler (or Navier-Stokes) equations, or with model equations such as the Ginzburg-Landau equation, the Korteweg-de Vries equation, the Boussinesq equation. Several papers also deal with the interaction between solitary waves and with multi-pulse solitary waves.

Hamiltonian systems are also well represented. In particular, there is an interesting article on the use of the multi-symplectic structure framework to study wave instability.

The classical problem of water waves is considered in several articles, with new results on the existence of generalized solitary waves (*i.e.* solitary waves with oscillatory tails), on the spectral stability of solitary waves as well as on the existence of fronts at the interface between two fluids of differing densities. More physical results on resonant capillary-gravity waves, solitary waves with oscillatory tails, the dynamics of waves in the Faraday experiment are provided as well.

The classical problem of thin films flowing down an inclined plane is considered in several articles which cover the theoretical as well as the experimental aspects.

New contributions to the well-known problems of Rayleigh-Bénard convection and of boundary-layer flow are given. The field of magnetohydrodynamics is also covered.

On the mathematical side, the reader can find new results on the mathematical theory of Navier-Stokes equations and on the justification of modulation equations.

Among what one may call the less classical problems, one finds the problems of capillary-gravity waves with negative surface tension (this might sound strange but the authors provide some physical reasons to study such waves), edge waves, short-crested waves, turbulent flood waves, frequency downshift, the impact of waves upon a vertical wall, gap solitons.

Several papers deal with numerical aspects of wave propagation. In particular, a software package named “Wavepack” for basic concepts and research in wave equations is presented.

In conclusion, the book edited by Mielke and Kirchgässner is an excellent one which provides a useful addition to the fluid-mechanics literature. I recommend this book to anyone who works on nonlinear waves in fluids. Needless to say that he or she will find at least one paper of interest (and probably more than that) in these proceedings.

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