

Nonlinear structures in physical systems

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Nonlinear Structures in Physical Systems Pattern Formation, Chaos and Waves, Proceedings of the Second Woodward Conference, San Jose State University, November 17–18, 1989, L. Iam and H. C. Morris (eds.) Springer-Verlag, New York, Berlin, Heidelberg (1990), p. 331.

The study of nonlinear structures, in our view, has become an interdisciplinary subject, which is attracting more and more physicists, chemists, biologists, and engineers. Springer has already published a number of books, devoted to the formation and dynamics of nonlinear structures. This publishing tradition has also been continued in this collective monograph. The book contains fresh materials of a representative conference, which brought together experts and pioneering investigators in various areas of nonlinear physics in order to exchange ideas and to share the latest findings in the dynamics of nonlinear structures, which have yet to be covered adequately in the literature or have not been touched upon at all.

Unfortunately, the size of this review does not allow even a brief discussion of all the materials presented in this collection and the diverse phenomena in which nonlinear structures appear. Therefore, we will only give a brief characterization of the sections in order that the readers themselves can obtain some notion about the contents.

The book is divided into five parts:

Part 1. Structure formation. This part is devoted primarily to experiments and computer models of the formation of nonlinear structures in galvanic processes and in the

hardening of alloys.

Part 2. Chaos. Questions of the reconstruction of random and chaotic sequences, prediction of earthquakes, and transformations of information in chaos are touched upon here. Moreover, experimental and theoretical studies of the properties of logistic mapping with periodic modulation are described.

Part 3. Convection and waves. This chapter contains papers dealing with the formation of nonlinear wave structures and during convection. These include laboratory studies of planetary-type eddies, traveling waves, arrays of connected mappings, and the dynamics of moving boundaries in nematics are presented.

Part 4. Nonlinear structures in materials. This chapter is completely devoted to the dynamics of nonlinear and fractal structures in magnetic domain films, glasses and polymers.

Part 5. Other topics. The title of this part of the book fully matches its contents: it contains papers devoted to the nonlinear dynamics of a flame, inhomogeneous formations in a plasma, planetary waves, degeneracy and asymmetry in biology.

This incomplete listing of the papers shows that the "forest rangers (Woodward Conference)" have assembled a rich variety of "species".

This book gives a fairly complete idea of the present-day status of the problem of the formation and dynamics of nonlinear structures in physics, planetology, biology, chemistry, and crystallography.