Chaos in Classical and Quantum Mechanics
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Chaotic Transport in Dynamical Systems

Provides a new and more realistic framework for describing the dynamics of non-linear systems.

A number of issues arise in applied dynamical systems from the viewpoint of problems of phase space transport are raised in this monograph. Illustrating phase space transport problems arising in a variety of applications that can be modeled as time-periodic perturbations of planar Hamiltonian systems, the book begins with the study of transport in the associated two-dimensional Poincaré Map. This serves as a starting point for the further motivation of the transport issues through the development of ideas in a non-perturbative framework with generalizations to higher dimensions as well as more general time dependence.

A timely and important contribution to those concerned with the applications of mathematics.
This textbook presents an introduction to the mathematical theory of cooperative behavior in active systems of various origin, both natural and artificial. This volume (the first of two) is devoted to the properties of regular self-organized patterns in distributed active systems. An analysis of pattern formation and self-supported wave propagation in active media is followed by a description of the properties of neural networks and their possible applications in the field of distributed analog information processing. The volume ends with a discussion of reproductive networks and evolutionary systems. Attention is focused on basic models which might appear in a wide range of applications. As illustrations, the author uses simplified examples borrowed from a variety of disciplines ranging from chemical and biological physics to market economics.

This book is the second of two volumes that together give a comprehensive introduction to the theory of cooperative behavior in active systems. This volume is devoted to the properties of the complex chaotic patterns that can arise in distributed active systems. The reader will encounter strange attractors, fractals, discrete maps, spatio-temporal chaos..., and will learn how these phenomena relate to the emergence of complex and chaotic patterns. Examples treated in detail include population explosion and extinction in fluctuating distributed media, and fluctuation effects in binary annihilation.
Communications in Mathematical Physics

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