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Frontiers of Complexity: The Search for Order in a Chaotic World

by: Roger Highfield

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Abstract

Accessible yet rigorous, this book goes far beyond most popularizations of "chaos" theory and presents the science of complexity, its historical origins, and current applications to cosmology, particle physics, ecology, evolution, and neurobiology. The emphasis on scientific computation and visualization as the microscope and lab bench of this new science is particularly welcome.

Very Highly Recommended. "SCIENCE JOURNALISM AT ITS BEST. . . An impeccably researched, amazingly up-to-date, crisply written and well-illustrated survey."
--Nature
At the cutting edge of the sciences, a dynamic new concept is emerging: complexity. In this groundbreaking new book, Peter Coveney and Roger Highfield explore how complexity in mathematics, physics, biology, chemistry, and even the social sciences is transforming not only the way we think about the universe, but also the very assumptions that underlie conventional science.
Complexity is a watchword for a new way of thinking about the behavior of interacting units, whether they are atoms, ants in a colony, or neurons firing in a human brain. The rise of the electronic computer provided both the key and the catalyst to our exploration of complexity.
A new generation of computers that runs on light and exploits the bizarre properties of quantum mechanics promises to deepen our understanding still further. The advances we have already witnessed are spectacular. The authors take us inside laboratories where scientists are evolving the genetic molecules that enabled life to emerge on earth and generating universes teeming with virtual creatures in cyber-space. We witness the utterly realistic behavior of a school of virtual fish--computer-generated replicas that have been trained to swim gracefully, hunt for food, and scatter at the approach of a leopard shark.
Compelling in its clarity, far-reaching in its implications, vibrant with the excitement of new discovery, Frontiers of Complexity is an arresting account of how far science has come in the past fifty years and an essential guide to the rapidly approaching future.
"[A] MARVELOUS AND COMPREHENSIVE WORK . . . Virtually any scientist or interested lay reader will find this book engrossing, edifying and inspiring."
--Publishers Weekly (starred review)

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- chaos complex_system self_organisation

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STRIPS: A new approach to the application of theorem proving to problem solving, the cult of personality, for example, characterizes a precessional fine.