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Titolo	Nonlinear Physics of Complex Systems [[electronic resource]] : Current Status and Future Trends / / edited by Jürgen Parisi, Stefan C. Müller, Walter Zimmermann
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Disciplina	530.1/5
Soggetti	Statistical physics Dynamical systems Thermodynamics Physics Physical chemistry Complex Systems Mathematical Methods in Physics Numerical and Computational Physics, Simulation Physical Chemistry Statistical Physics and Dynamical Systems
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Nota di contenuto	Bounds for properties of complex systems -- Instability without instability? -- Spontaneous density fluctuations in granular flow and traffic -- Pattern selection as a nonlinear eigenvalue problem -- Conditional probability distributions of a turbulent cascade -- The couette-taylor flow: A paradigmatic system for instabilities, pattern formation and routes to chaos -- Instabilities in smectic films -- Why air bubbles in water glow so easily -- Competition of growth patterns in directed growth -- Asymptotic dynamics in directional solidification -- Chemical waves in media with complex anisotropy -- Experiments on excitation waves -- Localized turbulence and cellular structures in systems with global coupling -- Bifurcation theory of meandering spiral waves -- Future trends in synergetics -- Synergetic hardware concepts

for self-organizing neural networks -- Nonlinear time series analysis — Potentials and limitations -- Time series analysis of scalar time-delay systems -- Control of chaos by self-adapted delayed feedback -- Mode analysis of the generalized rössler system -- Combinatorial optimization with coupled chemical reaction cells -- On superimposed dynamical multifractals -- The thermodynamics of random walks with applications to fractals and chaos -- Brownian rectifiers: How to convert brownian motion into directed transport -- Stochastics of pattern formation -- Dynamics in superconducting arrays of Josephson junctions -- Scanning probe microscopy of self-organized structure formation in semiconductor systems -- Impurity breakdown induced current filaments in n-GaAs -- Lattice-gas approach to collective transport phenomena in biological pattern formation -- Simulation of chemotaxis-equations in two space dimensions -- Dynamic instability and oscillations of microtubules.

Sommario/riassunto

The review articles in this book treat the overall nonlinear and complex behavior of nature from the viewpoint of such diverse research fields as fluid mechanics, condensed matter physics, biophysics, biochemistry, biology, and applied mathematics. Attention is focussed on a broad and comprehensive overview of recent developments and perspectives. Particular attention is given to the so-far unsolved problem of how to capture the mutual interplay between the microscopic and macroscopic dynamics that extend over various length and time scales. The book addresses researchers as well as graduate students.