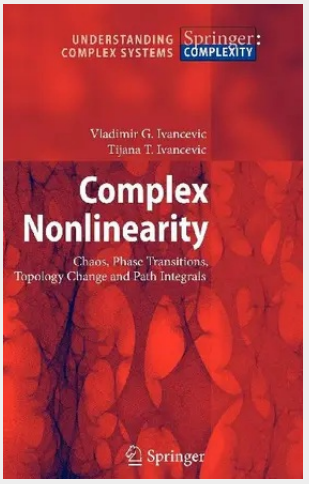
Ivancevic

Complex Nonlinearity

Chaos, Phase Transitions, Topology Change and Path Integrals



213,99 €
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is a book about prediction & control of general nonlinear and chaotic dynamics of high-dimensional complex systems of various physical and non-physical nature and their underpinning geometro-topological change.

The book starts with a textbook-like expose on nonlinear dynamics, attractors and chaos, both temporal and spatio-temporal, including modern techniques of chaos–control. Chapter 2 turns to the edge of chaos, in the form of phase transitions (equilibrium and non-equilibrium, oscillatory, fractal and noise-induced), as well as the related field of synergetics. While the natural stage for linear dynamics comprises of flat, Euclidean geometry (with the corresponding calculation tools from linear algebra and analysis), the natural stage for nonlinear dynamics is curved, Riemannian geometry (with the corresponding tools from nonlinear, tensor algebra and analysis). The extreme nonlinearity – chaos – corresponds to the topology change of this curved geometrical stage, usually called configuration manifold. Chapter 3 elaborates on geometry and topology change in relation with complex nonlinearity and chaos. Chapter 4 develops general nonlinear dynamics, continuous and discrete, deterministic and stochastic, in the unique form of path integrals and their action-amplitude formalism. This most natural framework for representing both phase transitions and topology change starts with Feynman's sum over histories, to be quickly generalized into the sum over geometries and topologies. The last Chapter puts all the previously developed techniques together and presents the unified form of complex nonlinearity. Here we have chaos, phase transitions, geometrical dynamics and topology change, all working together in the form of path integrals.

The objective of this book is to provide a serious reader with a serious scientific tool that willenable them to actually perform a competitive research in modern complex nonlinearity. It includes a comprehensive bibliography on the subject and a detailed index. Target readership includes all researchers and students of complex nonlinear systems (in physics, mathematics, engineering, chemistry, biology, psychology, sociology, economics, medicine, etc.), working both in industry/clinics and academia.

Basics of Nonlinear and Chaotic Dynamics.- Phase Transitions and Synergetics.- Geometry and Topology Change in Complex Systems.- Nonlinear Dynamics of Path Integrals.- Complex Nonlinearity: Combining It All Together.

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