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Collana	Understanding Complex Systems, , 1860-0832
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Soggetti	Statistical physics Dynamical systems Vibration Dynamics System theory Computational complexity Physics Complex Systems Vibration, Dynamical Systems, Control Systems Theory, Control Complexity Mathematical Methods in Physics Statistical Physics and Dynamical Systems
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Nota di contenuto	Introduction -- Paradigm for Chaos -- Main Features of Chaotic Systems -- Reconstruction of Dynamical Systems -- Controlling Chaos -- Synchronization of Chaotic Systems -- Stochastic Resonance -- The Appearance of Regular Fluxes Without Gradients -- Quantum Manifestations of Classical chaoticity -- Tunneling and Chaos.
Sommario/riassunto	This book offers a short and concise introduction to the many facets of chaos theory. While the study of chaotic behavior in nonlinear, dynamical systems is a well-established research field with ramifications in all areas of science, there is a lot to be learnt about

how chaos can be controlled and, under appropriate conditions, can actually be constructive in the sense of becoming a control parameter for the system under investigation, stochastic resonance being a prime example. The present work stresses the latter aspects and, after recalling the paradigm changes introduced by the concept of chaos, leads the reader skillfully through the basics of chaos control by detailing the relevant algorithms for both Hamiltonian and dissipative systems, among others. The main part of the book is then devoted to the issue of synchronization in chaotic systems, an introduction to stochastic resonance, and a survey of ratchet models. In this second, revised and enlarged edition, two more chapters explore the many interfaces of quantum physics and dynamical systems, examining in turn statistical properties of energy spectra, quantum ratchets, and dynamical tunneling, among others. This text is particularly suitable for non-specialist scientists, engineers, and applied mathematical scientists from related areas, wishing to enter the field quickly and efficiently. From the reviews of the first edition: This book is an excellent introduction to the key concepts and control of chaos in (random) dynamical systems [...] The authors find an outstanding balance between main physical ideas and mathematical terminology to reach their audience in an impressive and lucid manner. This book is ideal for anybody who would like to grasp quickly the main issues related to chaos in discrete and continuous time. Henri Schurz, Zentralblatt MATH, Vol. 1178, 2010.

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