

1. Record Nr.	UNINA9910409995503321
Titolo	Emerging Frontiers in Nonlinear Science // edited by Panayotis G. Kevrekidis, Jesús Cuevas-Maraver, Avadh Saxena
Pubbl/distr/stampa	Cham : , : Springer International Publishing : , : Imprint : Springer, , 2020
ISBN	3-030-44992-0
Edizione	[1st ed. 2020.]
Descrizione fisica	1 online resource (xxv, 373 pages) : illustrations
Collana	Nonlinear Systems and Complexity, , 2195-9994 ; ; 32
Disciplina	003.75
Soggetti	Statistical physics Physics System theory Mathematical physics Systems biology Biological systems Quantum computers Applications of Nonlinear Dynamics and Chaos Theory Applications of Graph Theory and Complex Networks Complex Systems Theoretical, Mathematical and Computational Physics Systems Biology Quantum Computing
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Chapter 1 – Nonlinearity and Biology (Zoi Rapti) -- Chapter 2 - Nonlinearity and Topology (Avadh Saxena, Panayotis G. Kevrekidis, and Jesús Cuevas-Maraver) -- Chapter 3 - Nonlinear Metamaterials (Lei Xu, Mohsen Rahmani, David A. Powell, Dragomir Neshev, Andrey E. Miroshnichenko) -- Chapter 4 - Nonlinearity and discreteness: solitons in lattices (Boris A. Malomed) -- Chapter 5 - Universal relaxation in quantum systems (Kazuya Fujimoto and Masahito Ueda) -- Chapter 6 - Nonlinearity and Networks: A 2020 Vision (Mason A. Porter) -- Chapter 7 - Integrability and Nonlinear Waves (Mark J. Ablowitz) -- Chapter 8 -

Nonequilibrium phenomena in nonlinear lattices: from slow relaxation to anomalous transport (Stefano Iubini, Stefano Lepri, Roberto Livi, Antonio Politi, and Paolo Politi) -- Chapter 9 - Nonlinearity, Geometry and Field Theory Solitons (Nicholas S. Manton) -- Chapter 10 - Nonlinear and Novel Phenomena in Non-Hermitian Photonics (Li Ge and Wenjie Wan) -- Chapter 11 - Computational Challenges of Nonlinear Systems (Laurette S. Tuckerman) -- Chapter 12 - Dissipative Systems (Edgar Knobloch) -- Chapter 13 - Synchronization in discrete models (Alexandre Rosas, Daniel Esca, Katja Lindenberg) -- Chapter 14 – Physics-informed learning machines for partial differential equations: Gaussian processes versus neural network (Guofei Pang and George Em Karniadakis).-Chapter 15- Nonlinear systems for unconventional computing (Kirill P. Kalinin and Natalia G. Berlo). .

---

## Sommario/riassunto

This book explores the impact of nonlinearity on a broad range of areas, including time-honored fields such as biology, geometry, and topology, but also modern ones such as quantum mechanics, networks, metamaterials and artificial intelligence. The concept of nonlinearity is a universal feature in mathematics, physics, chemistry and biology, and is used to characterize systems whose behavior does not amount to a superposition of simple building blocks, but rather features complex and often chaotic patterns and phenomena. Each chapter of the book features a synopsis that not only recaps the recent progress in each field but also charts the challenges that lie ahead. This interdisciplinary book presents contributions from a diverse group of experts from various fields to provide an overview of each field's past, present and future. It will appeal to both beginners and seasoned researchers in nonlinear science, numerous areas of physics (optics, quantum physics, biophysics), and applied mathematics (ODEs, PDEs, dynamical systems, machine learning) as well as engineering.

---