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| Autore                  | Kevrekidis Panayotis G  |
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| Altri autori (Persone)  | Cuevas-MaraverJesús   |
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| Soggetti                | System theory<br>Differential equations<br>Plasma waves<br>Nonlinear Optics<br>Bioinformatics<br>Complex Systems<br>Differential Equations<br>Waves, instabilities and nonlinear plasma dynamics<br>Computational and Systems Biology   |
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| Nota di contenuto       | Chapter 1. Fractional Dispersive Models and Applications (Panayotis G. Kevrekidis) -- Chapter 2. Fractional Wave Models and Their Experimental Applications (Boris A. Malomed) -- Chapter 3. Fractional Models in Biology and Medicine (Fractional Models in Biology and Medicine) -- Chapter 4. Fractional Dissipative PDEs (Franz Achleitner) -- Chapter 5. Symmetry breaking in fractional nonlinear Schrödinger and soliton dynamics in complex Ginzburg-Landau models (Pengfei Li) -- Chapter 6. Traveling waves in fractional models (Traveling waves in fractional models) -- Chapter 7. Numerical methods for fractional PDEs (Christian Klein) -- Chapter 8. Fractional Non-Linear Quantum Analysis, Probability, Discretization, and Limits (Kay L. Kirkpatrick) -- Chapter 9. Fractional Integrable Dispersive Equations (Mark J. Ablowitz) -- Chapter 10. Fractional discrete linear and nonlinear models (Mario I. Molina) -- Chapter 11. Breathers in the fractionalFrenkel-Kontorova model (J. |

Catarecha).

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Sommario/riassunto

This book explores the role of fractional calculus and associated partial differential equations in modeling multiscale phenomena and overlapping macroscopic & microscopic scales, offering an innovative and powerful tool for modeling complex systems. While integer order PDEs have a long-standing history, the novel setting of fractional PDEs opens up new possibilities for the simulation of multi-physics phenomena. The book examines a range of relevant examples that showcase the seamless transition from wave propagation to diffusion or from local to non-local dynamics in both continuum and discrete systems. These systems have been argued as being particularly relevant in contexts such as nonlinear optics, lattice nonlinear dynamical systems, and dispersive nonlinear wave phenomena, where the exploration of the potential fractionality has emerged as a highly active topic for current studies. The volume consists of contributions from a diverse group of active scholars and experts across different fields, providing a detailed examination of the field's past, present, and future state-of-the-art in the interplay of fractional PDEs and nonlinear wave phenomena. It is intended to be of wide interest to both seasoned researchers and beginners in the Field of Nonlinear Science. This book sets the stage for the next decade of research and beyond and is a timely and relevant reference of choice for this crucial junction of current research.

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