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| Collana | Frontiers in Applied Dynamical Systems: Reviews and Tutorials, , 2364-4532 ; ; 7 |
| Disciplina | 515.64 |
| Soggetti | Dynamics<br>Ergodic theory<br>Mathematical models<br>Dynamical Systems and Ergodic Theory<br>Mathematical Modeling and Industrial Mathematics |
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| Nota di contenuto | Mathematics for a nonsmooth world -- 1930-2010: Nonsmooth dynamics' linear age -- Discontinuities to model missing knowledge -- Three experiments -- Layers and implementations -- Ideal and non-ideal sliding -- The three experiments revisited -- Further curiosities of hidden dynamics -- Closing remarks: open challenges. . |
| Sommario/riassunto | This volume looks at the study of dynamical systems with discontinuities. Discontinuities arise when systems are subject to switches, decisions, or other abrupt changes in their underlying properties that require a 'non-smooth' definition. A review of current ideas and introduction to key methods is given, with a view to opening discussion of a major open problem in our fundamental understanding of what nonsmooth models are. What does a nonsmooth model represent: an approximation, a toy model, a sophisticated qualitative capturing of empirical law, or a mere abstraction? Tackling this question means confronting rarely discussed indeterminacies and ambiguities in how we define, simulate, and solve nonsmooth models. The author illustrates these with simple examples based on genetic regulation and investment games, and proposes precise mathematical |

tools to tackle them. The volume is aimed at students and researchers who have some experience of dynamical systems, whether as a modelling tool or studying theoretically. Pointing to a range of theoretical and applied literature, the author introduces the key ideas needed to tackle nonsmooth models, but also shows the gaps in understanding that all researchers should be bearing in mind. Mike Jeffrey is a researcher and lecturer at the University of Bristol with a background in mathematical physics, specializing in dynamics, singularities, and asymptotics.