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Unstable Singularities And Randomness: Their Importance In The Complexity Of Physical, Biological And Social Sciences



Synopsis

Traditionally, randomness and determinism have been viewed as being diametrically opposed, based on the idea that causality and determinism is complicated by "noise". Although recent research has suggested that noise can have a productive role, it still views noise as a separate entity. This work suggests that this not need to be so. In an informal presentation, instead, the problem is traced to traditional assumptions regarding dynamical equations and their need for unique solutions. If this requirement is relaxed, the equations admit for instability and stochasticity evolving from the dynamics itself. This allows for a decoupling from the "burden" of the past and provides insights into concepts such as predictability, irreversibility, adaptability, creativity and multi-choice behaviour. This reformulation is especially relevant for biological and social sciences whose need for flexibility a propos of environmental demands is important to understand: this suggests that many system models are based on randomness and nondeterminism complicated with a little bit of determinism to ultimately achieve concurrent flexibility and stability. As a result, the statistical perception of reality is seen as being a more productive tool than classical determinism. The book addresses scientists of all disciplines, with special emphasis at making the ideas more accessible to scientists and students not traditionally involved in the formal mathematics of the physical sciences. The implications may be of interest also to specialists in the philosophy of science. • Presents the ideas in an informal language. • Provides tools for exploring data for singularities.

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"This book is a clear text for understanding unstable singularities and randomness and their importance in the complexity of different application fields." Prof. Nicoletta Sala, University of Lugano in: Chaos and Complexity Letters, No. 4, 2004

Provides examples in physical, biological, social sciences, and the arts.

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