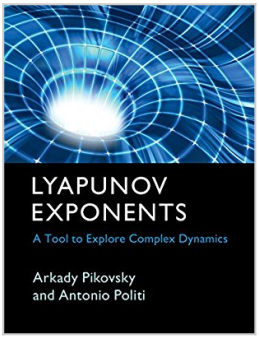

Lyapunov Exponents: A Tool to Explore Complex Dynamics

By Arkady Pikovsky, Antonio Politi

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Lyapunov exponents lie at the heart of chaos theory, and are widely used in studies of complex dynamics. Utilising a pragmatic, physical approach, this self-contained book provides a comprehensive description of the concept. Beginning with the basic properties and numerical methods, it then guides readers through to the most recent advances in applications to complex systems. Practical algorithms are thoroughly reviewed and their performance is discussed, while a broad set of examples illustrate the wide range of potential applications. The description of various numerical and analytical techniques for the computation of Lyapunov exponents offers an extensive array of tools for the characterization of phenomena such as synchronization, weak and global chaos in low and high-dimensional set-ups, and localization. This text equips readers with all the investigative expertise needed to fully explore the dynamical properties of complex systems, making it ideal for both graduate students and experienced researchers.

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Review
'... it should be required reading for anyone seriously engaged in the quantitative analysis of the dynamics of complex systems.' Robert C. Hilborn, Physics Today

About the Author
Arkady Pikovsky is Professor of Theoretical Physics at the University of Potsdam. He is a member of the editorial board for Physica D and Chaotic and Complex Systems Editor for the Journal of Physics A: Mathematical and Theoretical. He is a Fellow of the American Physical Society and co-author of Synchronization: A Universal Concept in Nonlinear Sciences. His current research focuses on nonlinear physics of complex systems.

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