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Foundations of Ergodic Theory

Rich with examples and applications, this textbook provides a coherent and self-contained introduction to ergodic theory suitable for a variety of one- or two-semester courses. The authors' clear and fluent exposition helps the reader to grasp quickly the most important ideas of the theory, and their use of concrete examples illustrates these ideas and puts the results into perspective.

The book requires few prerequisites, with background material supplied in the appendix. The first four chapters cover elementary material suitable for undergraduate students – invariance, recurrence and ergodicity – as well as some of the main examples. The authors then gradually build up to more sophisticated topics, including correlations, equivalent systems, entropy, the variational principle, and thermodynamic formalism. The 400 exercises increase in difficulty through the text and test the reader's understanding of the whole theory. Hints and solutions are provided at the end of the book.

Marcelo Viana is Professor of Mathematics at Instituto Nacional de Matemática Pura e Aplicada (IMPA), Rio de Janeiro and a leading research expert in ergodic theory and dynamical systems. He has served in several academic organizations, such as the International Mathematical Union (Vice-president 2011–2014), the Brazilian Mathematical Society (President 2013–2015), the Latin American Mathematical Union (Scientific Coordinator, 2001–2008) and the newly founded Mathematical Council of the Americas. He is also a member of the academies of science of Brazil, Portugal, Chile and the Developing World and he has received several academic distinctions, including the Grand Croix of Scientific Merit, granted by the President of Brazil, in 2000, and the Ramanujan Prize of ICTP and IMU, in 2005. He was an invited speaker at the international congress of mathematicians ICM 1994, in Zurich, a plenary speaker at the International Congress of Mathematical Physics ICMP 1994, and a Plenary Speaker at the ICM 1998, in Berlin. To date, he has supervised 32 doctoral theses. Currently, he leads the organization of the ICM 2018 in Rio de Janeiro and is also involved in initiatives to improve mathematical education in his country.

Krerley Oliveira is Associate Professor at the Universidade Federal de Alagoas (UFAL), Brazil, where he founded the graduate program in mathematics and the State of Alagoas Math Olympiad program, where he promotes young talents in mathematics. He was a medalist at the Brazilian Mathematical Olympiad (1996) and twice at the Iberoamerican Mathematical Olympiad for university students (1999 and 2000). He was elected an Affiliate Member of the Brazilian Academy of Sciences (2007–2012) and his research is focused on dynamical systems and ergodic theory.

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Foundations of Ergodic Theory

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