<<长距离相互作用随机及分数维动>>

图书基本信息

书名：<<长距离相互作用随机及分数维动力学>>

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前言

anomalous chaotic transport, plasma physics, and theory of chaos in waveguides. The book "Nonlinear Physics: from the Pendulum to Turbulence and Chaos" （Nauka, Moscow and Harwood, New York, 1988）, written with R. Sagdeev, is now a classical textbook for everybody who studies chaos theory. When studying interaction of a charged particle with a wave packet, George with colleagues from the Institute discovered that stochastic layers of different separatrices in degenerated Hamiltonian systems may merge producing a stochastic web. Unlike the famous Arnold diffusion in non-degenerated Hamiltonian systems, that appears only if the number of degrees of freedom exceeds 2, diffusion in the Zaslavsky webs is possible at one and half degrees of freedom. This diffusion is rather universal phenomenon and its speed is much greater than that of Arnold diffusion. Beautiful symmetries of the Zaslavsky webs and their properties in different branches of physics have been described in the book "Weak chaos and Quasi-Regular Structures" （Nauka,Moscow, 1991 and Cambridge University Press, Cambridge, 1991） coauthored with R. Sagdeev, D. Usikov, and A. Chernikov. In 1991, George emigrated to the USA and became a Professor of Physics and Mathematics at Physical Department of the New York University and at the Courant Institute of Mathematical Sciences. The last 17 years of his life he de-voted to principal problems of Hamiltonian chaos connected with anomalous kinetics and fractional dynamics, foundations of statistical mechanics, chaotic advection, quantum chaos, and long-range propagation of acoustic waves in the ocean. In his New York period George published two important books on the Hamiltonian chaos: "Physics of Chaos in Hamiltonian Systems" （Imperial College Press, London, 1998） and "Hamiltonian chaos and Fractional Dynamics" （Oxford University Press, NY,2005）. His last book "Ray and wave chaos in ocean acoustics: chaos in waveguides"（World Scientific Press, Singapore, 2010）, written with D. Makarov, S. Prants, and A. Virovlynsky, reviews original results on chaos with acoustic waves in the under-water sound channel.George was a very creative scientist and a very good teacher whose former stu-dents and collaborators are working now in America, Europe and Asia. He authored and coauthored 9 books and more than 300 papers in journals. Many of his works are widely cited. George worked hard all his life. He loved music, theater, literature and was an expert in good vines and food. Only a few people knew that he loved to paint. In the last years he has spent every summer in Provence, France, working ,writing books and papers and painting in water colors. The album with his watercolors was issued in 2009 in Moscow.

内容概要

In memory of Dr. George Zaslavsky, Long-range Interactions, Stochasticity and Fractional Dynamics covers'the recent developments of long-range interaction, fractional dynamics, brain dynamics and stochastic theory of turbulence, each chapter was written by established scientists in the field. The book is dedicated to Dr. George Zaslavsky, who was one of three founders of the theory of Hamiltonian chaos. The book discusses self-similarity and stochasticity and fractionality for discrete and continuous dynamical systems, as well as long-range interactions and diluted networks. A comprehensive theory for brain dynamics is also presented. In addition, the complexity and stochasticity for soliton chains and turbulence are addressed.   The book is intended for researchers in the field of nonlinear dynamics in mathematics, physics and engineering.

作者简介

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书籍目录

章节摘录

插图：Note that the continuous limit of discrete systems with power-law long-range interactions gives differential equations with derivatives of non-integer orders with respect to coordinates （Tarasov and Zaslavsky, 2006; Tarasov, 2006）. Fractional differentiation with respect to time is characterized by long-term memory effects that correspond to intrinsic dissipative processes in the physical systems. The memory effects to discrete maps mean that their present state evolution depends on all past states. The discrete maps with memory are considered in the papers （Fulinski and Kleczkowski, 1987;Fick et al., 1991; Giona, 1991; Hartwich and Fick, 1993; Gallas, 1993; Stanislavsky,2006; Tarasov and Zaslavsky, 2008; Tarasov, 2009; Edelman and Tarasov, 2009）.The interesting question is a connection of fractional equations of motion and thediscrete maps with memory. This derivation is realized for universal and standard maps in （Tarasov and Zaslavsky, 2008; Tarasov, 2009）. It is important to derive discrete maps with memory from equations of motion with fractional derivatives. It was shown （Zaslavsky et al., 2006） that perturbed by aperiodic force, the nonlinear system with fractional derivative exhibits a new type of chaotic motion called the fractional chaotic attractor.

编辑推荐

《长距离相互作用、随机及分数维动力学》编辑推荐：Nonlinear Physical Science focuses on the recent advances of fundamental theories and principles, analytical and symbolic approaches, as well as computational techniques in nonlinear physical science and nonlinear mathematics with engineering applications.

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