

<<超越KMA理论的哈密顿混沌>>

图书基本信息

书名：<<超越KMA理论的哈密顿混沌>>

13位ISBN编号：9787040291872

10位ISBN编号：7040291878

出版时间：2010-6

出版时间：高等教育出版社

作者：罗朝俊，（墨）阿弗莱诺维奇 编

页数：292

版权说明：本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问：<http://www.tushu007.com>

前言

George M. Zaslavsky was born in Odessa, Ukraine in 1935 in a family of an artillery officer. He received education at the University of Odessa and moved in 1957 to Novosibirsk, Russia. In 1965, George joined the Institute of Nuclear Physics where he became interested in nonlinear problems of accelerator and plasma physics. Roald Sagdeev and Boris Chirikov were those persons who formed his interest in the theory of dynamical chaos. In 1968 George introduced a separatrix map that became one of the major tools in theoretical study of Hamiltonian chaos. The work "Stochastic instability of nonlinear oscillations" by G. Zaslavsky and B. Chirikov, published in *Physics Uspekhi* in 1971, was the first review paper "opened the eyes" of many physicists to power of the theory of dynamical systems and modern ergodic theory. It was realized that very complicated behavior is possible in dynamical systems with only a few degrees of freedom. This complexity cannot be adequately described in terms of individual trajectories and requires statistical methods. Typical Hamiltonian systems are not integrable but chaotic, and this chaos is not homogeneous. At the same values of the control parameters, there coexist regions in the phase space with regular and chaotic motion. The results obtained in the 1960s were summarized in the book "Statistical Irreversibility in Nonlinear Systems" (Nauka, Moscow, 1970). The end of the 1960s was a hard time for George. He was forced to leave the Institute of Nuclear Physics in Novosibirsk for signing letters in defense of some Soviet dissidents. George got a position at the Institute of Physics in Krasnoyarsk, not far away from Novosibirsk. There he founded a laboratory of the theory of non-linear processes which exists up to now. In Krasnoyarsk George became interested in the theory of quantum chaos. The first rigorous theory of quantum resonance was developed in 1977 in collaboration with his co-workers. They introduced the important notion of quantum break time (the Ehrenfest time) after which quantum evolution began to deviate from a semiclassical one. The results obtained in Krasnoyarsk were summarized in the book "Chaos in Dynamical Systems" (Nauka, Moscow and Harwood, Amsterdam, 1985) .

<<超越KMA理论的哈密顿混沌>>

内容概要

Hamiltonian Chaos Beyond the KAM Theory Dedicated to George M. Zaslavsky (1935-2008) covers the recent developments and advances in the theory and application of Hamiltonian chaos in nonlinear Hamiltonian systems. The book is dedicated to Dr. George Zaslavsky, who was one of three founders of the theory of Hamiltonian chaos. Each chapter in this book was written by well-established scientists in the field of nonlinear Hamiltonian systems. The development presented in this book goes beyond the KAM theory, and the onset and disappearance of chaos in the stochastic and resonant layers of nonlinear Hamiltonian systems are predicted analytically, instead of qualitatively. The book is intended for researchers in the field of nonlinear dynamics in mathematics, physics and engineering.

<<超越KMA理论的哈密顿混沌>>

作者简介

编者：罗朝俊（墨西哥）阿弗莱诺维奇（Afraimoyich.V.）丛书主编：（瑞典）伊布拉基莫夫

<<超越KMA理论的哈密顿混沌>>

书籍目录

1 Stochastic and Resonant Layers in Nonlinear Hamiltonian Systems Albert C.J. Luo 1.1 Introduction 1.2 Stochastic layers 1.2.1 Geometrical description 1.2.2 Approximate criteria 1.3 Resonant layers 1.3.1 Layer dynamics 1.3.2 Approximate criteria 1.4 A periodically forced Duffing oscillator 1.4.1 Approximate predictions 1.4.2 Numerical illustrations 1.5 DiscussionsReferences2 A New Approach to the Treatment of Separatrix Chaos and Its Applications S.M. Soskin, R. Mannella, O.M. Yevtushenko, LA. Khovanov, P V.E. McClintock 2.1 Introduction 2.1.1 Heuristic results 2.1.2 Mathematical and accurate physical results 2.1.3 Numerical evidence for high peaks in $E(f)$ and their rough estimations 2.1.4 Accurate description of the peaks and of the related phenomena 2.2 Basic ideas of the approach 2.3 Single-separatrix chaotic layer 2.3.1 Rough estimates. Classification of systems 2.3.2 Asymptotic theory for systems of type I 2.3.3 Asymptotic theory for systems of type II 2.3.4 Estimate of the next-order corrections 2.3.5 Discussion 2.4 Double-separatrix chaos 2.4.1 Asymptotic theory for the minima of the spikes 2.4.2 Theory of the spikes' wings 2.4.3 Generalizations and applications 2.5 Enlargement of a low-dimensional stochastic web 2.5.1 Slow modulation of the wave angle 2.5.2 Application to semiconductor superlattices 2.5.3 Discussion 2.6 Conclusions 2.7 Appendix 2.7.1 Lower chaotic layer 2.7.2 Upper chaotic layer References3 Hamiltonian Chaos and Anomalous Transport in Two Dimensional Flows Xavier Leoncini 3.1 Introduction 3.2 Point vortices and passive tracers advection 3.2.1 Definitions 3.2.2 Chaotic advection 3.3 A system of point vortices 3.3.1 Definitions 3.4 Dynamics of systems with two or three point vortices 3.4.1 Dynamics of two vortices 3.4.2 Dynamics of three vortices 3.5 Vortex collapse and near collapse dynamics of point vortices 3.5.1 Vortex collapse 3.5.2 Vortex dynamics in the vicinity of the singularity 3.6 Chaotic advection and anomalous transport 3.6.1 A brief history 3.6.2 Definitions 3.6.3 Anomalous transport in incompressible flows 3.6.4 Tracers (passive particles) dynamics 3.6.5 Transport properties 3.6.6 Origin of anomalous transport 3.6.7 General remarks 3.7 Beyond characterizing transport 3.7.1 Chaos of field lines 3.7.2 Local Hamiltonian dynamics 3.7.3 An ABC type flow 3.8 Targeted mixing in an array of alternating vortices 3.9 Conclusion References4 Hamiltonian Chaos with a Cold Atom in an Optical Lattice S. V. Prants 4.1 Short historical background 4.2 Introduction 4.3 Semiclassical dynamics 4.3.1 Hamilton-Schrodinger equations of motion 4.3.2 Regimes of motion 4.3.3 Stochastic map for chaotic atomic transport 4.3.4 Statistical properties of chaotic transport 4.3.5 Dynamical fractals 4.4 Quantum dynamics 4.5 Dressed states picture and nonadiabatic transitions 4.5.1 Wave packet motion in the momentum space 4.6 Quantum-classical correspondence and manifestations of dynamical chaos in wave-packet atomic motion References5 Using Stochastic Webs to Control the Quantum Transport of Electrons in Semiconductor Superlattices T.M. Fromhold, A.A. Krokhin, S. Bujkiewicz, P.B. Wilkinson, D. Fowler, A. Patane, L. Eaves, D.P.A. Hardwick, A.G. Balanov, M.T. Greenaway, A. Henning 5.1 Introduction 5.2 Superlattice structures 5.3 Semiclassical electron dynamics 5.4 Electron drift velocity 5.5 Current-voltage characteristics: theory and experiment... 5.6 Electrostatics and charge domain structure 5.7 Tailoring the SL structure to increase the number of conductance resonances 5.8 Energy eigenstates and Wigner functions 5.9 Summary and outlook References6 Chaos in Ocean Acoustic Waveguide A.L. Virovlyansky 6.1 Introduction 6.2 Basic equations 6.2.1 Parabolic equation approximation 6.2.2 Geometrical optics. Hamiltonian formalism 6.2.3 Modal representation of the wave field 6.2.4 Ray-based description of normal modes 6.3 Ray chaos 6.3.1 Statistical description of chaotic rays 6.3.2 Environmental model 6.3.3 Wiener process approximation 6.3.4 Distribution of ray parameters 6.3.5 Smoothed intensity of the wave field 6.4 Ray travel times 6.4.1 Timefront 6.4.2 Statistics of ray travel times 6.5 Modal structure of the wave field under conditions of ray chaos.. 6.5.1 Coarse-grained energy distribution between normal modes 6.5.2 Transient wave field 6.6 Conclusion References

章节摘录

插图：The stochastic web concept dates back to the 1960s when Arnold showed (Arnold, 1964) that, in non-degenerate Hamiltonian systems of dimension exceeding 2, resonance lines necessarily intersect, forming an infinite-sized web in the Poincaré section. It provides in turn for a slow chaotic (sometimes called "stochastic") diffusion for infinite distances in relevant dynamical variables. It was discovered towards the end of 1980s (Zaslavsky et al., 1986; Chernikov et al., 1987a,b, 1988) that, in degenerate or nearly-degenerate systems, a stochastic web may arise even if the dimension is $3/2$. One of the archetypal examples of such a low-dimensional stochastic web arises in the 1D harmonic oscillator perturbed by a weak traveling wave the frequency of which coincides with a multiple of the natural frequency of the oscillator (Zaslavsky, 2007; Chernikov et al., 1987b; Zaslavsky et al., 1991) . Perturbation plays a dual role: on the one hand, it gives rise to a slow dynamics characterized by an auxiliary Hamiltonian that possesses an infinite web-like separatrix; on the other hand, the perturbation destroys this self-generated separatrix, replacing it by a thin chaotic layer. Such a low-dimensional stochastic web may be relevant to a variety of physical systems and plays an important role in corresponding transport phenomena: see (Zaslavsky, 2007; Chernikov et al., 1987b; Zaslavsky et al., 1991) for reviews on relevant classical systems. In addition, there are quantum systems in which the dynamics of transport reduces to that in the classical model described above. The latter concerns e.g. nanometre-scale semiconductor superlattices with an applied voltage and magnetic field (Fromhold et al., 2001, 2004) .

<<超越KMA理论的哈密顿混沌>>

编辑推荐

《超越KMA理论的哈密顿混沌(英文版)》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.

<<超越KMA理论的哈密顿混沌>>

版权说明

本站所提供下载的PDF图书仅提供预览和简介，请支持正版图书。

更多资源请访问:<http://www.tushu007.com>