

New books on physics and related sciences

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Gorbunov D S, Rubakov V A *Introduction to the Theory of the Early Universe: Theory of the Hot Big Bang* (Moscow: URSS, 2008) 552 pp. ISBN 978-5-382-00657-4.

This book was written largely from the standpoint of the linkage between cosmology and the physics of the microscopic world. It presents the results for the uniform isotropic Universe at the hot stage of its evolution and at the subsequent cosmological stages. The main chapters deal with the established concepts of the early and contemporary Universe; these chapters may serve as an introduction to this vigorously expanding branch of science. To facilitate the reading of the main sections, the necessary information from the general theory of relativity and elementary particle theory are given. Furthermore, the book considers hypotheses (often alternatives to one another) that deal with unsolved problems of cosmology, such as the problems of dark matter, dark energy, matter–antimatter asymmetry and some others. It is assumed that a sequel volume should be written later, treating the theory of evolution of cosmological perturbations, inflation theory, and the theory of postinflation heating. The book will appeal to researchers, postgraduates, and students who specialize in elementary particle physics and cosmology. ('Editorial URSS' Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax (7-499) 135-44-23, 135-42-16; e-mail: urss@urss.ru; URL: <http://www.urss.ru/>)

Gorelik G S *Oscillations and Waves. Introduction to Acoustics, Radiophysics and Optics* (Moscow: Fizmatlit, 2007) 656 pp. ISBN 5-9221-0776-1.

Thus is the third edition of the best textbook on oscillations and wave processes encountered in mechanics, acoustics, optics, radiophysics, and electrodynamics. The book is unique in world literature owing to its original interpretation of many physical phenomena in terms of the oscillation theory and to conclusive examples of the unified pattern of laws governing oscillations and waves of different physical natures. The book remains necessary for students of physical, physico-technical, and radioelectronics departments of technical universities and for physicists — theoreticians and experimenters — specializing in radiophysics, acoustics, and optics, but also for university students doing chemistry, biology, medical sciences, ecology, economics, or social sciences. ('Fiziko-matematicheskaya literatura' MAIK 'Nauka/Interperiodika' Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Karlov N V, Kirichenko N A *Initial Chapters of Quantum Mechanics* (Moscow: Fizmatlit, 2006) 360 pp. ISBN 5-9221-0538-8.

This book puts forth a systematic exposition of the basic laws of quantum mechanics and of experimental facts forming the foundation of this science. The mathematical apparatus of quantum mechanics is introduced. Such phenomena as tunneling, energy levels of a particle in a potential well, angular momentum and magnetic moment of a particle, spin, the Pauli exclusion principle, Mendeleev's periodic system of elements, and the Zeeman effect are treated in a consistent fashion. For applications of the general theory, the book considers the principles underlying quantum electronics and elements of the theory of an atomic nucleus. The section 'Seminar' analyzes a number of problems that complement the main content of the book. The book will be a valuable resource for students taking quantum mechanics within a general physics course and for teachers, as well as for anyone interested in the matters of principle in today's physics. ('Fiziko-matematicheskaya literatura' MAIK 'Nauka/Interperiodika' Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Shchegolev I F *Elements of Statistical Mechanics, Thermodynamics and Kinetics* 2nd ed. (Dolgoprudnyi: Izd. Intellect, 2008) ISBN 978-5-91559-006-8.

This textbook written by a well-known experimental physicist introduces readers to the basics of classical statistical physics and thermodynamics. The unconventional structure of the book makes it an ideal clarifying complement to a standard course of general physics. Methodically complicated subjects are presented in an original manner and very clear style and worked problems are taken from real physics. Main attention is paid to the relation between microscopic states and macroscopic parameters of the system, a consistent introduction of equilibrium statistical distributions, and prerequisites for starting to take into account quantum effects, as well as to phase transitions, and transport processes. The book will be of interest to students and teachers at physics and chemistry departments of technical universities. (Intellect Publ.: 141700 Dolgoprudnyi, Moscow region, Promyshlennyi proezd 14; tel. (7-495) 408-76-81; e-mail: ifs@id-intellect.ru; URL: <http://www.id-intellect.ru/>)

Kozlov V V *Gibbs Ensembles and Nonequilibrium Statistical Mechanics* (Moscow–Izhevsk: Regular and Chaotic Dynamics, Institute for Computer Studies, 2008) 208 pp. ISBN 978-5-93972-645-0.

Consistent nonequilibrium statistical mechanics is developed in the framework of the theory of Gibbs ensembles. It is relied on the idea of weak limits of solutions to the Liouville equation for infinitely growing time. This idea solves in a

natural way the problem of converting to a macroscopic description in which attention is mainly focused on studying the evolution of mean values (expectation values) of dynamic quantities. This approach differs from traditional approaches to the problem of irreversibility — indeed, equilibrium states of dynamic systems in the past and in the future coincide. Results of a general nature are applied to solving specific problems of classical statistical mechanics. The book is intended for mathematicians, physicists, and specialists in mechanics who are interested in statistical mechanics and in the foundations of thermodynamics. (Institute for Computer Studies Publ.: 426034 Izhevsk, ul. Universitetskaya 1; tel./fax (7-3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: <http://ics.org.ru/>)

Blokh A M *The Nobel Prize: A Popular Explanation of Everything* (Moscow: Izd. BuKos, 2008) 153 pp. ISBN 978-5-98015-025-9.

The book describes the unique system of giving awards for fundamental discoveries in the natural sciences, for achievements in the realm of literature, and in social and political activities aimed at protecting peace on Earth; the prize was created by Swedish academicians at the turn of the 19th and 20th centuries. This book is predominantly intended for senior grades of schools and undergraduate students of science and technology universities, but will also appeal to a broad range of readers interested in the history of science. ('BuKos' Publ.: 113035 Moscow, Kosmodamianovskaya nab. 40–42, bldg. 3; tel. (7-495) 485-83-54; e-mail: info@bookos-book.ru; URL: <http://www.bookos-book.ru/>)

Anishchenko V S *Meet Nonlinear Dynamics* 3rd ed., revised and enlarged (Moscow: URSS, 2008) 224 pp. ISBN 978-5-382-00513-3.

This textbook contains the texts of twelve lectures of the course 'Introduction to Nonlinear Dynamics' that the author delivers in the Physics Department of N G Chernyshevsky Saratov State University. The lectures present the fundamentals of the nonlinear dynamics of systems with a finite number of degrees of freedom. Concepts of the dynamic system, stability and bifurcations, deterministic chaos, and synchronization of periodic and chaotic oscillations are formulated and analyzed. Descriptions are given of generators of quasiperiodical and chaotic oscillations; the problems of reconstruction of dynamic systems and of regime diagnostics on the basis of experimental data are discussed. The textbook is mostly intended for students preparing graduation projects and for postgraduates of universities specializing in natural sciences, and can be useful for teachers delivering lectures on the theory of oscillations, and the theory of dynamic systems and synergetics. ('Editorial URSS' Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax (7-499) 135-44-23, 135-42-16; e-mail: urss@urss.ru; URL: <http://www.urss.ru/>)

Varaksin A Yu *Collisions in Gas Flows with Solid Particles* (Moscow: Fizmatlit, 2008) 312 pp. ISBN 5-9221-0944-8.

The book focuses on problems of modeling turbulent gas flows that carry a dispersed admixture of solid particles. Special attention is paid to treating various collisional

processes (particle–particle, particle–wall, particle–body) taking place in heterogeneous flows. Dimensionless criteria responsible for the presence and intensity of the above interactions are proposed and verified using a large array of experimental and numerically simulated data. The characteristics of turbulent heterogeneous flows in channels (pipes), as well as in the vicinity of streamlined bodies and in boundary layers, are analyzed in detail. The results of physical and mathematical modeling of gas flows with solid particles, obtained in recent years by both Russian and Western researchers, are described and analyzed. The book will serve as an invaluable reference source for researchers engaged in studying gas dynamics and heat and mass exchange in multiphase flows, as well as for teachers, postgraduates, and undergraduates of higher education establishments. ('Fiziko-matematicheskaya literatura' MAIK 'Nauka/Interperiodika' Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax: (7-495) 334-76-20; e-mail: fizmat@maik.ru; URL: <http://www.fml.ru/>)

Krasnopol'skaya T S, Shvets A Yu *Regular and Chaotic Dynamics of Systems with Restricted Excitation* (Moscow–Izhevsk: Regular and Chaotic Dynamics, Institute for Computer Studies, 2008) 280 pp. ISBN 978-5-93972-619-1.

The book investigates the inception, evolution, and destruction of deterministic chaos in some pendulum, electroelastic, and hydrodynamic systems with restricted excitation. A great variety of types of chaotic attractors and scenarios of transition to chaos were found. Phase portraits, cross sections and Poincaré maps, distributions of spectral densities, and invariant measures of regular and chaotic attractors were constructed and thoroughly analyzed. The influence of various delay factors on the dynamic stabilization of pendulum systems was studied. The book will be of interest for undergraduate students, postgraduates, teachers at universities, and specialists in nonlinear dynamics. (Institute for Computer Studies Publ.: 426034 Izhevsk, ul. Universitetskaya 1; tel./fax (7-3412) 50-02-95; e-mail: subsc-ribe@rcd.ru; URL: <http://ics.org.ru/>)

Roldugin V I *Physics and Chemistry of Surfaces* (Dolgoprudnyi: Izd. Intellect, 2008) 568 pp. ISBN 978-5-91559-008-2.

A monograph–textbook on the hot topic at the boundary of physical chemistry, condensed matter physics, hydrodynamics, and the physics of two-dimensional systems. It discusses equilibrium surfaces and nonequilibrium processes for all possible interfaces, including the electronic structure, and processes on the surface, films and interlayers, all known types of adsorption, and the dynamics of liquid surfaces. The book is in fact an all-encompassing encyclopedia of surface phenomena and constitutes a significant contribution to progress in physical chemistry, serving also as an irreplaceable textbook for departments of physics and chemistry at universities. (Intellect Publ.: 141700 Dolgoprudnyi, Moscow region, Promyshlennyi proezd 14; tel. (7-495) 408-76-81; e-mail: lfs@id-intellect.ru; URL: <http://www.id-intellect.ru/>)

Zubchaninov V G *Stability and Plasticity* (Moscow: Fizmatlit, 2008) 336 pp. ISBN 5-9221-0886-7.

The book presents the fundamentals of the theory of systems stability beyond the limits of elasticity, the general concept

of stability, and the theory of stability of the elements of the structures under complex loading. It reflects the main stages of the buildup and evolution of plastic stability of shells and plates under complex loading, the theory of stability of unloading and additionally loading elastoplastic systems, and the theory of stability of the elements of the structures beyond the elastic limit under creep conditions. The book is addressed to research workers, teachers at higher educational institutions, practising engineers, and postgraduates specializing in the mechanics of deformable solid bodies and the theory of plastic stability. ('Fiziko-matematicheskaya literatura' MAIK 'Nauka/Interperiodika' Publ.: 117997 Moscow, ul. Profsoyuznaya 90; tel. (7-495) 334-74-21; fax (7-495) 334-76-20; e-mail: izmat@maik.ru; URL: <http://www.fml.ru/>)

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