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New books on physics and related sciences

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Borovik E S, Eremenko V V, Mil'ner A S ***Lectures on Magnetism*** 3rd edition, revised and enlarged (Moscow: Fizmatlit, 2005) 512 pp. ISBN 5-9221-0577-9.

The book gives a groundwork of the magnetic properties of matter and examines the fundamentals of what is known about a technical magnetization curve and the nature of spontaneous ordering in ferro- and antiferromagnetic materials. Brief information is given about the interaction of magnetic materials with an electromagnetic field: nuclear and electron paramagnetic resonances, ferro- and antiferromagnetic resonances, and gamma resonance (Mössbauer effect). Background requirements include basic thermodynamics and quantum theory as provided by an atomic physics course. It is designed for students specializing in magnetism or taking a general physics course as part of a program in the physics department of a university. (Fizmatlit Publ.: 117997 Moscow, Profsoyuznaya ul. 90; tel. (7-095) 334-74-21; fax (7-095) 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fml.ru/)

Kabisov K S, Kamalov T F, Lur'e V A ***Vibrations and Wave Phenomena: Theory and Problems with Solutions*** (Moscow: Editorial URSS, 2005) 360 pp. ISBN 5-484-00049-1.

This book, designed as a concise theoretical course on the subject, provides a step-by-step introduction to the fundamental concepts and equations describing mechanical vibrations and waves. Each section contains problems grouped by complexity, which help readers gain a deeper understanding of the theoretical material and master it. Detailed solutions to most of the problems are provided together with methodical hints and cross-references to the corresponding formulas and sections in the theoretical course. A basic background in mathematical analysis, vector calculus, and complex numbers is assumed on the part of the student. In mathematical supplements to the book, all necessary information from these areas of mathematics is presented to make the textbook easier to work with. It is designed for students seeking technician qualification and for teachers. (Editorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax (7-095) 135-44-23, 135-42-16; e-mail: urss@urss.ru; URL: http://www.urss.ru/)

Guzhov V I, Il'inykh S P ***Computer Interferometry*** A manual (Novosibirsk: Izd. NGTU, 2004) 252 pp. ISBN 5-7782-0362-4.

In this book, a new realm of research combining classical interferometry, speckle-interferometry, and digital image processing is introduced, in which computer technology presumably will be used not only to analyze interferograms but also to introduce feedback to an optical circuit. Attention is focused on step phase shift techniques. A new method to eliminate phase ambiguity using module arithmetic is described, the method enabling the user to extend the range of the measurements by an order of magnitude. A number of coherent-optical measuring techniques are used as examples to illustrate the ways in which the methods discussed in the book can be put to practice. It is suitable for research workers and undergraduate students specializing in the fields of optics, interferometry, and holography. (Novosibirsk State Technical University Publishing-Printing Complex: 630092 Novosibirsk, prosp. K. Marksa 20; tel./fax: (7-3832) 46-31-87; e-mail: office@publish.nstu.ru; URL: http://www.publish.nstu.ru/)

Khitsenko V E ***Self-Organization: Elements of the Theory and Social Applications*** (Moscow: Editorial URSS, 2005) 224 pp. ISBN 5-484-00085-8.

The book covers the effects and criterions of self-organization in those complex systems that are little known among the broad community involved in self-organization research. The author proceeds by choosing two base systems-theoretical models and consecutively comparing them in the context of self-organization. The principles and approaches of evolutionary management, which takes into account the self-organization trends of social interactions, are conceptually discussed; the potentials and limitations of biological analogies in control problems are demonstrated, and a comparative analysis of centralized and decentralized systems is made. Managerial cybernetics and S Beer's viable system model are exposed in nonspecialist terms, illustrating many earlier formulated statements of self-organization theory. The book will be of great interest to research workers pondering the phenomenon of the spontaneous emergence and subsequent maintenance of order in complex systems, both natural and social. It will also be useful to undergraduate students of sociology, cybernetics, management, and anyone interested in self-organization processes in inanimate and animate nature. (Editorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for Systems Analysis; tel./fax (7-095) 135-44-23, 135-42-16; e-mail: urss@urss.ru; URL: http://www.urss.ru/)

Dubnishchev Yu N, Arbuzov V A, Belousov P P, Belousov P Ya ***Optical Methods of Flow Explorations*** (Novosibirsk: Izd. Sib. Univ., 2003) 418 pp. ISBN 5-94087-183-6.

Optical methods and tools for the optical diagnostics of gas and condensed matter flows are exposed in a systematic yet accessible manner. Special attention is given to such topics as laser Doppler anemometry, Hilbert optical methods for studying phase optical density fields, real-time visualization of velocity fields, and 2D and 3D technologies for measuring kinematic and structural flow parameters. Coverage also

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includes the application of optical diagnostics in experimental hydro- and aerodynamics, thermal physics, and noninvasively controlled industrial production processes. The common nature of the existing approaches to the analysis and synthesis of major optical flow diagnostics techniques is demonstrated and discussed. Material is presented from the perspective of the theory of linear systems as applied to optics, making the book accessible to a wide variety of readers. The book is intended for specialists in applied optics and measuring techniques, as well as for those using optical control and optical measurement techniques in their day-to-day work. (Siberian University Publ.: 630058 Novosibirsk-58, P.O. Box 134; tel./fax: (7-383) 332-52-32; e-mail: post_book@sup99.ru; URL: http://www.sup99.ru/)

Terebizh V Yu ***Modern Optical Telescopes*** (Moscow: Fizmatlit, 2005) 80 pp. ISBN 5-9221-0586-8.

The past quarter century has witnessed a near tenfold increase in the total area of the mirrors used in astronomical telescopes operating at optical wavelengths. Modern instruments allow for more detailed images of astronomical objects compared to their predecessors (in particular, the 'atmospheric barrier' to image quality has been overcome). How has such rapid progress become possible? What is the design of a modern telescope? What new projects are planned for the coming years? These are the questions discussed in this booklet. The historical continuity of telescope design ideas is traced. It will be equally valuable to undergraduate astronomy majors, research workers in adjacent disciplines, and general readers with an interest in natural science. (Fizmatlit Publ.: 117997 Moscow, Profsoyuznaya ul. 90; tel. (7-095) 334-74-21; fax (7-095) 334-76-20; e-mail: fizmat@ maik.ru; URL: http://www.fml.ru/)

Ageev E P ***Non-Equilibrium Thermodynamics in Questions and Answers*** 2nd edition revised and enlarged (Moscow: MTsNMO, 2005) 160 pp. ISBN 5-94057-191-3.

The book explores, in question and answer form, the traditional themes related to processes proceeding in homogeneous, discontinuous, and continuous thermodynamic systems, including basic definitions and concepts, formulation of the postulates, and process features. The second edition adds material on the specific features of chemical reaction kinetics in open systems, multiplicity of stationary states of such systems, the stability analysis of open systems, and entropy change calculations with allowance made for nonequilibrium heat transfer processes. The book is intended for undergraduate and postgraduate students, young researchers, and faculty with an interest in nonequilibrium thermodynamics. (Publishing House of the Moscow Center for Continuous Mathematical Education: 121002 Moscow, Bol'shoi Vlas'evskii per. 11; tel. (7-095) 241-72-85; fax (7-095) 291-65-01; e-mail: biblio@mccme.ru; URL: http://www.mccme.ru/)

Filachev A M, Taubkin I I, Trishenkov M A ***Sold State Photoelectronics*****:** ***Physical Foundations*** (Moscow: Fizmatkniga, 2005) 384 pp. ISBN 5-89155-128-4.

This volume is derived from lectures delivered to seniors at the Moscow Institute of Physics and Technology and the Moscow Institute of Radioengineering, Electronics and Automation, as well as to those taking professional development in-service courses at N É Bauman Moscow State Technical University. This is a textbook on the physical principles of solid state photoelectronics, a rapidly developing field of modern science and technology. Emphasis is placed on providing the reader with fundamental knowledge necessary for successful work without assistance. Topics discussed include the wave and corpuscular properties of optical radiation, its natural and technical sources, and its propagation through the atmosphere and optical elements and systems. Also covered are the energy structure and the optical, electrical, and physical properties of semiconductors which constitute the primary fabrication material for solid state photoelectronics. Due to the wide employment of microelectronic photoreceivers and matrix pattern generators, much attention is given to the passage of regular and random signals through electronic circuits, and to how best to filter a signal from background noise. It is intended primarily for students majoring in engineering physics, informatics and computer technology, instrument engineering, optotechnology, as well as electronics and microelectronics. The book will also be useful to postgraduate students, practising engineers and research workers specializing in the development and application of photoelectronic and optoelectronic devices. (Fizmatkniga ANO Publ.: 141700 Moscow region, Dolgoprudnyi, per. Institutskii 6b; tel. (7-095) 408-76-81; URL: http://www.fizmatkniga.ru/)

Tarko A M ***Anthropogenic Changes in Global Biospheric Processes*****:** ***Mathematical Modeling*** (Moscow: Fizmatlit, 2005) 232 pp. ISBN 5-9221-0591-4.

The book presents results of mathematical modeling for the biosphere and for its parts, analyzes the interaction between human activity and nature, forecasts large-scale biospheric and climatic changes, and develops a methodology for assessing the capability of the biosphere to weaken anthropogenic impacts on it (the Le Chatelier principle). Carbon dioxide emission is estimated in terms of concentration change, and its effects on the atmospheric temperature and land and sea biota parameters are calculated. Calculations are made of what the implementation of the Kyoto protocol to the Framework Convention on climate stabilization would do. The ecological consequences of a large-scale nuclear war are described (nuclear winter). It is shown that Russian territory can be a crucial factor in reducing global anthropogenic impacts. An analysis is made of how Russian economy may develop given the country's natural characteristics and intellectual potential. The book is intended for mathematicians, ecologists, geographers, soil scientists, philosophers, and political scientists engaged in the analysis and forecast of biospherical processes on a global and regional scale, but it will also appeal to undergraduate and postgraduate students in these disciplines, as well as to general readers concerned with the future of the biosphere and humankind. (Fizmatlit Publ.: 117997 Moscow, Profsoyuznaya ul. 90; tel. (7-095) 334-74-21; fax (7-095) 334-76-20; e-mail: fizmat@ maik.ru; URL: http://www.fml.ru/)

Il'in V P ***Numerical Analysis*** Pt. 1 (Novosibirsk: Izd. IVMiMG, 2004) 335 pp. ISBN 5-901-548-21-3.

This book focuses on the theoretical fundamentals and algorithmic peculiarities of approximation methods for

functions and functionals, including: interpolation; mean square, uniform, and spline approximations, and numerical differentiation and integration. The stability of calculations to rounding errors in finite-valued number theory and to input data errors is examined. Classical numerical methods and modern textbook-worth algorithms are also covered. The material is based on a lecture course that has been taught for many years at the Mechanics and Mathematics Department of Novosibirsk State University. Both the Computational Mathematics Chair of Novosibirsk State University and the Academic Council of the Institute of Computational Mathematics and Mathematical Geophysics of the Siberian Branch of the RAS have recommended this book for underground students in natural science disciplines. The intended audience also includes postgraduate students and research workers who use computational and applied mathematics in their everyday work. (SB RAS Publ.: 630090, Novosibirsk, P.O. Box 187, Morskoi prosp. 2; tel. (7-3832) 30-84-66; fax (7-3832) 33-37-55); URL: http://www.psb.ad-sbras.nsc.ru/)

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