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New books on physics and related sciences

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Zheltikov A M ***Optics of Microstructured Fibers*** (Moscow: Nauka, 2004) 281 pp. ISBN 5-02-033074-4.

This book reviews the basic physics underlying the waveguide optics of microstructured optical fibers — a new type of optical waveguides different in their architecture, principle of operation, and properties from common optical fibers. Topics covered include waveguide mode peculiarities, nonlinear mechanisms for enhancing optical interactions, and the practical applications of microstructured and photonic-crystal fibers in various research areas, including supershort pulse optics, laser physics, nonlinear optics, optical metrology, laser biomedicine, and laser photochemistry. The material of the book is based largely on microstructured fiber optics research conducted at the Laboratory of Photonics and Nonlinear Spectroscopy of the General Physics and Wave Processes Faculty at M V Lomonosov Moscow State University. This book will provide an invaluable reference source for specialists and postgraduate and senior undergraduate students in optics and laser physics, as well as for a wide range of readers with a physics and engineering background interested in the problems of modern optics. (The Russian Academy of Sciences Publishing Center 'Nauka': 117997 GSP-7, Moscow V-485, Profsoyuznaya ul. 90; tel./fax (7-095) 334-98-59; e-mail: initsiat@naukaran.ru; URL: http//www.naukaran.ru/)

Vavilov Yu N ***Long Searched for. A Book about the Brothers Nikolaĭ and Sergeĭ Vavilov*** (Moscow: FIAN, 2004) 336 pp.

The book presents documents related to the life, career, arrest, and imprisonment of Academician Nikolaĭ Ivanovich Vavilov, which his son Yuriĭ discovered in many archives, including those of the FSB (former KGB), Russian Federation President (Stalin's Fund), RF Chief Military Prosecutor's Office, and the Royal Society of London, as well as the Russian Federation and US National Archives. Some of the documents have been published for the first time in this collection. The book contains brief recollections of the author's life, in particular of his childhood years in St.-Petersburg and wartime years in Saratov, and includes accounts of his encounters, in his travels abroad, with famous people such as the Russian artist and public figure S N Rerikh, the Senator and future Vice-President Albert Gore, the US Librarian of Congress James Billington, etc. Also included are the author's essays on and recollection of his uncle Academician Sergeĭ Ivanovich Vavilov — the prominent Soviet physicist who was of huge help to the family of his brother in times of hardship. (P N Lebedev Physics Institute, RAS: 119991 GSP-1, Moscow V-333, Leninskiĭ prosp. 53; tel. (7-095) 135-42-64; fax (7-095) 938-22-15; URL: http://www.lebedev.ru/)

Uspekhi Fizicheskikh Nauk **174** (6) 695 – 696 (2004)
Translated by E G Strel'chenko

Gribbin J, Gribbin M ***Richard Feynman: A Life in Science*** (Translated from English by N A Zubchenko) (Moscow – Izhevsk: Institute for Computer Studies, 2002) 288 pp. ISBN 5-93972-221-0.

This book traces the life and professional career of the eminent 20th century scientist, examines his roles as one of the creators of the atomic bomb and the founder of the quantum electrodynamics and quantum chromodynamics, and portrays him as a superior teacher and simply as a 'physics-crazy' person. Also, Richard Feynman's character and personality in all their complexity and originality are revealed in the pages of this book which will be a valuable addition to the bookshelves of anyone interested in the history of modern science. (Institute for Computer Studies: 426034 Izhevsk, ul. Universitetskaya 1; tel./fax (7-3412) 500-295; e-mail: borisov@rcd.ru; URL: http://ics.org.ru/)

Trubetskov D I ***Introduction to Synergetics. Vibrations and Waves*** ('Synergetics: From the Past to the Future' Series) (Moscow: Editorial URSS, 2003) 224 pp. ISBN 5-354-00531-0.

In this book the branch of modern science covering vibrations and waves is presented in terms of the effects and phenomena it deals with in medicine, chemistry, ecology, hydrodynamics, electronics, economics, social sciences, etc. The objective of the book is to show that concepts such as vibrations and waves, instability and nonlinearity, chaos, and structures enable understanding the unity of the modern views on the world. The book also shows how the vibration and wave ideas penetrate into various fields and disciplines. It will be especially useful for pupils in physics and mathematics classes of secondary schools, and first year undergraduates in natural sciences. This book was developed from the lectures in humanities the author delivered at Saratov State University, so the text can be of interest and value to a wide range of readers taken a fancy to synergetics. (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, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Trubetskov D I ***Introduction to Synergetics. Chaos and Structures*** ('Synergetics: From the Past to the Future' Series) (Moscow: Editorial URSS, 2004) 240 pp. ISBN 5-354-00532-9.

In this book the branch of modern science covering vibrations and waves is presented in terms of the effects and phenomena it deals with in medicine, chemistry, ecology, hydrodynamics, electronics, economics, social sciences, etc. The objective of the book is to show that concepts such as vibrations and waves, instability and nonlinearity, chaos, and structures enable understanding the unity of the modern views on the world. The book also shows how the vibration and wave ideas

penetrate into various fields and disciplines. Particular emphasis has been placed on chaos and structures — two central themes of synergetics. While of interest in itself, the book can also be considered as a sequel to the author's *Introduction to Synergetics. Vibrations and Waves* (Moscow: Editorial URSS, 2003). It will be especially useful for pupils in physics and mathematics classes of secondary schools, and first year undergraduates in natural sciences. This book was developed from the lectures in humanities the author delivered at Saratov State University, so the text can be of interest and value to a wide range of readers taken a fancy to synergetics. (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, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Ketsaris A A ***Algebraic Foundations of Physics. Spacetime and Action as Universal Algebras*** ('Relata Refero' Series) (Moscow: Editorial URSS, 2004) 280 pp. ISBN 5-354-00761-5.

The monograph examines a version of the unified theory of interactions, which involves the transition from the four-dimensional spacetime to the space of tensors of all orders and employs the multidimensional generalization of the Lagrange principle of least action. The methods of algebra and differential geometry, including the Cartan method of differential forms, are used and most of the calculations are worked out in detail in this book aimed at specialists, faculty, and undergraduate students in theoretical physics and mathematics. (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, 135-42-46; e-mail: urss@urss.ru; URL: http://urss.ru/)

Rodin V V ***Magnetic Resonance Methods*** (Moscow: Izd. MFTI, 2004) 95 pp. ISBN 5-7417-0228-7.

Nuclear magnetic resonance (NMR) methods based on the phenomenon of resonance in a system of particles having magnetic moments are presented. Theoretical foundations of radio spectroscopy techniques are examined using the nuclei of the hydrogen atom (protons) as an example. Coverage also includes the magnetic properties of nuclei, basic characteristics of NMR techniques, experimental approaches to their investigation, and some important applications to the study of the molecular properties and structure. NMR is characterized as a major tool for probing the composition as well as the molecular and crystal structure of a material, and for studying the dynamics of molecular interactions in nonmetal compounds. High-resolution NMR techniques and NMR-relaxation methods are reviewed, and NMR equipment is briefly described. Practical examples from NMR research applications accompany the text. A number of questions and problems with solutions are also given in the manual. The book is designed for seminar sessions and may be employed as supplementary material to lectures on the subject of 'Magnetic Resonance Methods' within the framework of the course 'Methods of Physical Investigation' studied by undergraduate and postgraduate students at the Molecular and Biological Physics Department. (MFTI Publ.: 141700 Dolgoprudnyĭ, Moscow region, Institutskiĭ per. 9; tel. (7-095) 408-76-81)

Polyanin A D, Manzhirov A V ***Handbook of Integral Equations*** (Moscow: Fizmatlit, 2003) 608 pp. ISBN 5-9221-0288-5.

The handbook contains over 2,200 integral equations and their solutions. Special attention is given to general form equations dependent on arbitrary functions. Exact, asymptotic, approximate analytical, and numerical solutions for linear and nonlinear integral equations are presented. For a better understanding of the methods described, examples of the solution for specific equations are provided. A number of integral equations encountered in elasticity theory, plasticity theory, mass- and heat-transfer theory, aero- and hydrodynamics, the theory of vibrations, electrodynamics, and other applications are covered. By and large, the handbook is intended for a broad spectrum of research workers, university teachers, engineers, and students specializing in various areas of mathematics, mechanics, physics, control theory, and engineering sciences. (Fiziko-Matematicheskaya Literatura & MAIK Nauka/Interperiodika Publishing: 117997 Moscow, Profsoyuznaya ul. 90; tel./fax (7-095) 334-74-21, 334-76-20; e-mail: fizmat@maik.ru; URL: http://www.fizmatlit.ru/)

Subbotin A I ***Generalized Solutions to First-Order Partial Differential Equations. Dynamic Optimization Prospects*** (Izhevsk: RKhD, 2003) 336 pp. ISBN 5-93972-206-7.

Hamilton – Jacobi equations and other types of first-order partial differential equations are dealt with in many branches of mathematics, mechanics, and physics, as well as in their many applications. Generally, functions with substantial meaning that are involved in problems to be solved are not smooth enough to satisfy these equations in the classical sense, necessitating the introduction of the concept of a generalized solution and the development of a theory and methods by which such a solution can be found. Such theories have been proposed and worked out actively in the last 50 years. Among the approaches that have won recognition and are currently being rapidly developed are S N Kruzhkov's entropy solutions, viscosity solutions by M Crandall and P L Lions, and V P Maslov's generalized solutions based on idempotent analysis. The author present his theory of minimax solutions, which has its origin in N N Krasovskiĭ's theory of positional differential games and can be considered as a nonclassical method of characteristics in which the minimax solution must be weakly invariant with respect to characteristic differential inclusions. Topics covered include theorems of existence, uniqueness, and correctness of minimax solutions, illustrative model examples from and applications to optimal control theory and differential games, constructive and numerical methods for finding minimax solutions, and necessary facts from the theory of differential inclusions, nonsmooth analysis, and the theory of the classical solutions for Hamilton – Jacobi equations. This book is intended for specialists in the theory of differential equations, dynamic optimization, and nonsmooth analysis and their applications, as well as for teachers and undergraduate and postgraduate students in related disciplines. (Research and Publishing Center 'Regular and Chaotic Dynamics': 426034 Izhevsk, ul. Universitetskaya 1, UdSU, RKhD; tel./fax (7-3412) 50-02-95; e-mail: subscribe@rcd.ru; URL: http://rcd.ru/)

Belozerov L G, Kireev V A ***Composite Shells under the Force and Heat Action*** (Moscow: Izd. Fiziko-Matematicheskoĭ Literatury, 2003) 388 pp. ISBN 5-94052-064-7.

The book is concerned with the development of reliable methods for assessing ultimate loads applied to shell structures in a nonuniform, nonstationary temperature field. The first part covers the basic theoretical aspects of strength and stability of composite shells under the influence of forces and heats; in the second part, the results of the experimental check of the proposed computing methods are presented. Readers' audience of this monograph involves research workers, technologists, engineers, and university faculty as well as undergraduate and postgraduate students. (Fiziko-Matematicheskaya Literatura Publ.: 119071 Moscow, Leninskiĭ prosp. 15; tel. (7-095) 952-49-25; fax (7-095) 955-03-30; e-mail: fizmatlit@mtu-net.ru; URL: http://www.fizmatlit.narod.ru/)

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