PACS number: 01.30.Tt

New books on physics and related sciences

Hilbert D Selected Works (General Ed. A N Parshin) Vol. 1 Invariant Theory. Number Theory. Algebra. Geometry. Foundations of Mathematics (Moscow: Faktorial, 1998) 575 pp.; Vol. 2 Analysis. Physics. Topical Problems. Personalia (Moscow: Factorial, 1998) 608 pp. RFBR project 96-01-14195.

These two-volume collected works of the prominent German scientist David Hilbert (1862–1943) contain his most significant papers, almost all of which appear for the first time in Russian. The first volume is devoted to Hilberts's work in such fields as the invariant theory, the number theory, algebra, geometry and the foundations of mathematics. The second, on analysis, calculus of variations, integral equations, and physics, also includes the essay "Mathematical Problems," articles about H Minkowski and A Hurwitz, and personalia. Intended for mathematicians, physicists, and historians of science. (Faktorial Publishers address: 117449, Moscow, POB 331)

Problems in High-Energy Physics. Proceedings of the IV Winter Workshop on Theoretical Physics (St.-Petersburg: PIYaF Press, 1998) 278 pp. Supported by RFBR under Grant No. 98-02-26005.

A collection of reports presented at the IV Petersburg Winter Workshop on theoretical physics held at Repino, St. Petersburg environs, Russia, 22-28 February 1998 in memory of the RAS Corresponding Member, physics theoretician Vladimir Naumovich Gribov (1930-1997). The workshop was organized by Petersburg Institute of Nuclear Physics (PIYaF). The introductory article by Yu V Petrov provides an account of V N Gribov's life and work and is followed by the memoirs of B L Ioffe and L N Lipatov. D'yakonov, Shuvaev, Danilov, and Gorskiĭ lectured such 'purely' theoretical topics as confinement, QCD structure and extensions, and string and supersymmetric theories. In reports by Ioffe, Petrov and Pobylitsa, and Glozman earlier strong interaction approaches are developed for the purpose of describing measured or predicted quantities. Frankfurt and Strikman's analysis of present-day views on diffraction effects aims at designing new experiments to check these views both qualitatively and quantitatively. While Khriplovich and coworkers depart from the theory of elementary particles, their reports on astrophysics and atomic physics are undoubtedly of general physical interest. As the IV Petersburg Winter Workshop was taking place simultaneously with the XXXII PIYaF Winter Workshop on the physics of atomic nuclei and elementary particles, many of its reports were intended for theorists and experimenters alike.

Ovsyannikov D A, Egorov N V *Simulation of the Formation Systems for Electron and Ion Beams* (St.-Petersburg: St. Petersburg State University Press, 1998) 276 pp. Bibliography: 310 refs. Printed in accordance with the resolution of the St. Petersburg State University Press Editorial Board (1996 thematic plan, sec. 71) and is supported in part by the RFBR through Grant No. 96-01-00926.

Based on highly effective mathematical modeling and numerical simulation methods and advanced computation and optimization techniques, this book discusses and offers solutions to the problems of formation, focusing, and transport of intense electron and ion beams. For computer specialists and mathematical modeling experts working in physical electronics and beam physics, and for all those engaged in the engineering design of electronic and beam devices. (St. Petersburg State University Press address: 199034, St.-Petersburg, Universitetskaya nab., 7/9)

Gukhman A A, Zaĭtsev A A *Generalized Analysis* (Moscow: Faktorial, 1998) 304 pp. Bibliography: 162 refs. RFBR project 97-02-30072.

The authors examine generalized analysis as a quantitative investigational tool and a method for presenting results in the most rational form possible. Three basic aspects of the discipline — similarity theory, dimension analysis, and the method of characteristic scales — are considered as a single whole combined not only on the base of common objectives but a unified thematical groundwork as well. (Faktorial Publishers address: 117449, Moscow, POB 331)

Fomenko A T Visual Geometry and Topology: Mathematical Images in the Real World 2nd ed. (Moscow: Moscow State University Press and Che-Ro Publishers, 1998) 416 pp. Bibliography: 92 refs.

This book, the first edition of which was published in 1992, aims to present in a plain and accessible style some classical results and more recent advances in the science of geometry, both of fundamental and applied nature. The text gives particular attention to the graphical and vivid presentation of the basic concepts and objects of modern geometry and topology. All the figures throughout the text are drawn by the author himself. Fomenko describes in vivid terms recent computer geometry results obtained within the framework of his 'Computer Geometry' program at Moscow State University's Department of Mechanics and Mathematics. Highlighted in the book are some of the research areas currently being developed at Dr.Sci. (Phys.-Math.) A V Bolsinov's 'Computer Methods in Natural Sciences and Humanities' Laboratory at the Chair of Basic and Applied Differential Geometry. For those interested in the applications of modern geometry and topology as well as for undergraduate (starting from freshmen) and post-graduate students in natural science disciplines (Moscow State Uni-

Uspekhi Fizicheskikh Nauk **169** (8) 935–936 (1999) Translated by E G Strel'chenko

versity Press address: 103009, Moscow, ul. B. Nikitskaya, 5/7. TOO 'Che-Ro' phone numbers: (095) 939-2481, 939-3381)

Neretin Yu A Symmetry Classes and Infinite-Dimensional Groups (Moscow: Editorial URSS, 1998) 432 pp. Bibliography: 270 refs. RFBR project 96-01-14034.

This volume offers a systematic presentation of the theory of infinite-dimensional groups, their representations and semigroup and categorical envelopes. It looks in detail at the group of circumference diffeomorphisms, infinitedimensional analogues of classical groups, transformation groups for measure spaces, and some stream groups. Coverage also includes infinite analogues of symmetric groups and loop groups. A number of chapters cover topics which are related to the finite-dimensional Lie groups; these topical problems only emerged when the theory of infinite-dimensional groups came into being. The categorical version of the second quantization method underlies the approach adopted in the text. Except for editorial changes, this Russian edition does not differ from the English, 1996 Oxford University Press edition. For mathematicians and mathematical physicists as well as undergraduate and postgraduate students in this field. (Editorial URSS Publishers contact information: tel./fax (095) 135-4423; tel. (095) 135-4246; e-mail: urss@urss.isa.ac.ru)

Polyanin A D, Manzhirov A V Handbook of Integral Equations: Exact Solutions (Moscow: Faktorial, 1998) 432 pp. Bibliography: 61 refs.

The reference book describes over 2,100 integral equations and their solutions with emphasis on equations written in the general form, depending on arbitrary functions or containing many free parameters. The volume includes many new exact solutions of both linear and nonlinear equations and covers a number of interesting equations encountered in various areas of mechanics and theoretical physics such as theory of elasticity, theory of plasticity, theory of mass and heat transfer, aero- and hydrodynamics, theory of vibrations, electrodynamics, etc. A valuable resource for a wide circle of researchers, university teachers, engineers, and students in various areas of mathematics, mechanics, physics, chemistry, and biology. (Faktorial Publishers address: 117449, Moscow, POB 331)

Polyanin A D, Vyaz'min A V, Zhurov A I, Kazenin D A Handbook of Exact Solutions to Heat and Mass Transfer Equations (Moscow: Faktorial, 1998) 368 pp. Bibliography: 95 refs. RFBR project 97-02-30029.

Exact solutions to linear and nonlinear equations of heat and mass transfer are presented in this handbook. Coverage includes steady and unsteady heat conduction equations with constant or variable coefficients and for various types of initial and boundary conditions. Solutions for one-, two-, and three-dimensional heat conduction problems for solid bodies of various shapes are given in detail. The text highlights exact analytical solutions for convective heat conduction in channels, tubes, etc. and heat and mass transfer in regions of various shapes in the presence of volume and surface chemical reactions. New exact solutions to nonlinear equations of heat and mass transfer and for combustion theory are presented. An appendix at the end of the book describes an analytical method of solving differential equations using a CONVODE software package (currently available by e-mail). Intended for a wide circle of researchers, university teachers, engineers, and students in heat and mass transfer phenomena, thermal physics, mathematical physics, hydrodynamics, mechanics of dispersive media, chemical technology, meteorology, and biomechanics. (Faktorial Publishers address: 117449, Moscow, POB 331)

Aleksandrov V M, Pozharskii D A Nonclassical Three-Dimensional Problems in Mechanics of Elastic Contact Interactions (Moscow: Faktorial, 1998) 288 pp. Bibliography: 172 refs. RFBR project 95-01-00036.

Based on decades of extensive mathematical research and bringing together of widely sparse published material, this book presents numerical and analytical solution methods as well as solutions themselves — for a wide range of nonclassical three-dimensional problems of the mechanics of elastic bodies in contact. Coverage includes semibound bodies (half-space, layer, cylinder, space with cylindrical cavity, wedge, cone, half-space with a spherical notch or salience, space with a spherical cavity) as well as bounded bodies (circular slab, spherical layer and sector of spherical layer, spherical lens, and sphere). The methods discussed will also find application in mechanics of fracture, hydroaeromechanics, electrostatics, thermodynamics, theory of diffusion, radiophysics, and acoustics. For specialists in the mechanics of contact interactions, mechanics of continuous media and mathematical physics, for engineers and undergraduate and post-graduate students at university departments of mechanics, mathematics, and physics. (Faktorial Publishers address: 117449, Moscow, POB 331)

Physics of Microwaves: Advances in Microwave Physics 1995–1998 In 2 volumes (Editor-in-chief E V Suvorov) (Nizhniĭ Novgorod: IPF RAN, 1999) 412 pp.

This collection is published according to the joint resolution of the Research Council for the Interindustry Scientific and Technological Program 'Physics of Microwaves' at the RF Ministry for Science and Technology and the Press Editorial Board of the RAS Institute of Applied Physics (IPF RAN). The two volumes contain reports on 53 projects carried out in the framework of the microwave physics program led by A V Gaponov-Grekhov. The major topics covered include: (1) microwave radiation sources; (2) propagation of microwave radiation and environment monitoring; (3) microwave spectroscopy and metrology, and microwave radiation receivers, and (4) interaction of microwave radiation with matter. The physical effects and mechanisms studied along with methods and devices developed within the program find uses in radio spectroscopy, communications technology, radar, radiovision, remotely controlled environment probing, new technologies, plasma chemistry, etc. A valuable resource for a wide range of radio physicists and radio engineers. (IPF RAN address: 603600, Nizhniĭ Novgorod, ul. Ul'yanova, 46)

Ocean Acoustics. Proceedings of Academician L M Brekhovskikh's Workshop (Moscow: GEOS, 1998) 360 pp. RFBR projects 98-05-74003 and 96-15-98367.

This book contains all the 82 author-edited papers presented at Academician L M Brekhoskikh's VII Workshop on the 'Acoustics of the Ocean', held at the P P Shirshov Institute of Oceanology, RAS, Moscow on 25-28 May 1998. The workshop, alias the VII session of the Russian Acoustical Society, was attended by acoustics researchers from Moscow, St.-Petersburg, Nizhniĭ Novgorod, Vladivostok, Taganrog, Rostov-on-Don, Voronezh, Irkutsk, etc. Scientific coverage spans the tomography and monitoring of the ocean; the structure of sound fields in the ocean; mechanisms for the formation of various types of ocean noise; structural nonuniformities exhibiting in depth, on surface, and bed; field measurement and acoustic signal processing techniques. All the papers adopted by the Workshop Organizing Committee are included. (GEOS Publishers contact information: tel. (095) 230-8092, fax (095) 231-0443)

The Works of Academician A N Tikhonov: Bibliographical Index (Moscow: Dialog-MGU, 1998) 54 pp.

Published according to a resolution of the Scientific Council of the Moscow State University's Computational Mathematics and Cybernetics Department, this volume presents a complete bibliography (over 500 titles) of the RAS Academician Andreĭ Nikolaevich Tikhonov. The publication is prepared within the framework of the project 'Creation of the Educational and Scientific Centre for Applied Mathematics and Informatics' as part of the special-purpose federal program 'State Support for the Integration of Higher Education and Fundamental Science for 1997–2000'. A useful reference for undergraduates, post-graduates and specialists in general and computational mathematics. (Dialog MGU Publishers contact information: tel. (095) 939-3890, (095) 928-1042 and tel./fax (095) 939-3891)