

New books on physics and related sciences

Kapitza P L *Scientific Works. Science and Modern Society* (Compiled by P E Rubinin, Editor-in-Chief A S Borovik-Romanov) (Moscow: Nauka, 1998) 539 pp. RFBR project 97-06-87016.

Covering the 1913–1982 period, the book contains Petr Leonidovich Kapitza's papers, speeches, and talks on such topics as the role and significance of science and the scientist in the modern world; global scientific problems; the organization of science; creative physics education, and the history of science. Much of the scientist's archive material is published for the first time, and the most complete collection ever of P L Kapitza's exercise problems is presented as an Appendix. An important book for all those interested in how science develops.

Gorshkov A S *Selected Works* (Compiled by K I Volyak) (Moscow, 1998) 360 pp.

Written on the 70th birthday of radiophysicist Anatoliĭ Savel'evich Gorshkov, this volume collects his major publications in scientific periodicals in Russia and abroad and concludes with essays on his life and career. Designed for use by radiophysicists and related specialists, the book will also be of interest to the teachers and professors as well as senior undergraduate and graduate students.

Gladkov S O *Physics of Porous Media* (Moscow: Nauka, 1997) 175 pp. Bibliography: 146 refs.

Offering a systematic framework for the theoretical and experimental study of basic physical properties of porous materials, Gladkov describes the nonstandard behavior of some physical parameters, in particular, the breakdown voltage and the loss tangent, and discusses in detail a method for calculating the coefficient of heat conduction of porous dielectrics. The method depends on the nonequilibrium principle and can be applied to such apparently 'hopeless' materials as cellulose, composites and composite materials.

Varaksin A N *Interaction and Migration of Point Structural Defects in Dielectrics Based on Alkaline–Halogen Crystals (Computer Simulation)* (Ekaterinburg: Ural Branch of RAN, 1997) 128 pp. Bibliography: 176 refs.

The formation, interaction, and migration of point structural defects in solids based on nominally pure, slightly doped and mixed alkaline–halogen crystals are considered in this book using computer simulation models involving such approaches as molecular statistics, molecular dynamics, the Monte Carlo

method, and truncated modelling schemes. The formation, interaction, and migration energies of structural defects are calculated along with the electrical conductivity of slightly doped and mixed alkaline–halogen crystals. The author analyzes the basic mechanisms of elementary abrupt changes in diffusion and uses analytical (phenomenological and microscopic) methods as well as computer simulation techniques. The book also gives an understanding of how the characteristics of an elementary abrupt change in diffusion relate to the macroscopic properties of a defect-containing crystal. In addition to researchers concerned with defect crystal physics and solid-state computations, the book will also serve the needs of undergraduate and postgraduate physics students.

Symmetries and Conservation Laws in the Equations of Mathematical Physics (Eds A M Vinogradov, I S Krasil'shchik) (Moscow: Faktorial, 1997) 464 pp. Bibliography: 157 refs. RFBR project 95-01-02825.

The book describes the geometrical theory of differential equations and shows through numerous examples what the conservation laws and the symmetries of a differential equation are. Intended both for theoretical mathematicians and for those involved in applied research in mathematics, mechanics, and physics.

Trofimov V V, Fomenko A T *Algebra and Geometry of Integrable Hamiltonian Differential Equations* (Moscow: Faktorial, 1995) 448 pp. Bibliography: 529 refs.

The authors present new methods for integrating Hamiltonian differential equations on symplectic manifolds, discussing most aspects of the field in an easy-to-follow manner for the general reader. The book not only provides a classical background and reviews current approaches to the integration of systems of Hamiltonian differential equations, but also presents the results obtained by the authors themselves and by the participants of the 'Modern geometrical methods' workshop the authors lead at the MSU Mechanics and Mathematics Department. Intended for researchers (mathematicians, physicists, specialists in mechanics) as well as for undergraduate and postgraduate students interested in related disciplines.

Dmitriĭ Vasil'evich Shirkov. *On his 70th birthday* (Dubna: OIYaI, 1998) 96 pp.

March 3, 1998 marked the 70th birthday of the Russian theoretical physicist Dmitriĭ Vasil'evich Shirkov. Included in this collection are his autobiography, an annotated bibliography of his works, and some of his scientific papers.

Korentsova M M *Colin Maclaurin 1698–1746* (Science and Bibliography Series, Editors-in-Chief S S Demidov,

A P Yushkevich) (Moscow: Nauka, 1998) 144 pp. Bibliography: 109 refs.

The author traces the life and career as well as the social and public activities of Colin Maclaurin, an eighteenth-century British mathematician and mechanics scientist and one of I Newton's disciples and followers. A valuable resource for anyone interested in the world's scientific history.

Bashmakova I G, Gnedenko B V, Demidov S S, Dorofeeva A V, Kuzicheva Z A, Petrova S S, Smirnova G S, Tikhomirov V M *Essays in the History of Mathematics* Textbook (Ed. B V Gnedenko) (Moscow: Moscow State University Press, 1997) 496 pp. Bibliography: 70 refs.

Each of the five essays of this collection explores a historical perspective on — and, based on the latest data, discusses the historical background of — a particular mathematical discipline, including mathematical analysis and algebra, probability theory, mathematical logic, theory of extremal problems, and functional analysis. The book is recommended as an undergraduate level textbook by the Russian Federation's Ministry of General and Professional Education.

Kozoderov V V, Kosolapov V S, Sadovnichii V A, Timoshin O A, Tishchenko A P, Ushakova L A, Ushakov S A *Physical Geography from Space: Mathematical and Information Fundamentals* (Ed. V A Sadovnichii) (Moscow: Moscow State University Press, 1998) 571 pp. Bibliography: 203 refs.

The monograph provides the basic concepts underlying the analysis and prediction of environmental changes at the global and regional levels and describes the relevant climate and biosphere models. Among the topics discussed are the optimization of observation systems, the organization of geo-information systems (GISs) and new GIS applications to physical geography from space. At the heart of the studies described are the ideas of order and chaos in static and dynamic systems, which are treated here in terms of sets, information measures, and entropy metrics. Possible realizations of the suggested approaches in internationally set experiments are described. For researchers interested in geoinformatics, the application of space techniques, and Earth's investigation with cosmic apparatus.

Proceedings of the Radiophysics Conference Dedicated to the 80th Anniversary of the N I Lobachevskii Nizhniĭ Novgorod State University (held on 7 May 1998 in Nizhniĭ Novgorod) (Ed. A V Yakimov) (Nizhniĭ Novgorod: NNSU Press, 1998) 108 pp.

Based on the proceedings of the scientific conference organized by the NNSU Radiophysics Department, the book covers the basic research activities of the Department's sub-faculties and presents results obtained by the NNSU staff members and undergraduate and postgraduate students as well as participants from other radiophysics institutions. The publication is prepared within the framework of the special-purpose federal program 'Integration' — Educational and Scientific Centre 'Basic Radiophysics', Section 1.6: 'Recreation of scientific olympiads, competitions, and scientific

schools and conferences for the young'. An electronic version of the collection can be accessed at: <http://www.rf.unn.runnet.ru>

Laser-Based Techniques for Studying Water and Water Solutions (Proceedings of the RAS General Physics Institute, Vol. 54, Ed. G A Lyakhov) (Moscow: Nauka, Fizmatlit, 1997) 160 pp.

This book presents experimental and theoretical results on liquid water, gas mixtures and associative water solutions based on an optical- and radio-frequency controlled-exposure study. In particular, a laser-based method for determining the phase diagram of a segregated solution and the parameters of nonlinear segregation kinetics is implemented; an anomaly in associative solution properties due to hydrogen bond competition is reported; the theory of multiplicative-noise-induced phase transitions is applied to nonlinear dynamics, population kinetics, and thermodynamics of solutions. Other developments have to do with the scattering and excitation of electromagnetic waves in electrolytes and ionized gases; and with the effect the distributed feedback in a randomly inhomogeneous liquid has on induced light scattering. Finally, a method for the remote control of acoustic perturbations is developed, relying on the scattering of electromagnetic radiation on an acoustic lattice excited across an interface. For researchers, engineers, and postgraduate students concerned with radiophysics, nonlinear optics, the spectroscopy of gases and liquids, and with the physical chemistry of condensed media.

Compiled by *E V Zakharova*