

## New books on physics and related sciences

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**Valiev K A, Kokin A A** *Quantum Computers: Expectations and Reality* 2nd ed. (Izhevsk: RKhD, 2004) 320 pp. ISBN 5-93972-024-2.

In the first attempt of its kind in Russia, the mathematical and physical foundations of quantum computing and the principles of quantum computers are systematically explored in this monograph. The book presents the key definitions of quantum information theory and describes basic quantum logic operations and quantum algorithms; discusses limitations to full-scale quantum computations and how they can possibly be overcome; examines in detail some specific variants of quantum computer prototypes, already and still to be realized, and analyzes their advantages, shortcomings, and realization challenges. Some original results obtained by the authors are included in the book. The content of the book relies on the research experience gathered by the year 2000 and reflected mainly in foreign scientific publications and on the Internet. The book will appeal to a wide range of specialists, including mathematicians, physicists, and computer system designers, and will also be a useful reference for faculty and undergraduate and postgraduate students in related disciplines. (Research Publishing Center ‘Regular and Chaotic Dynamics’: 426034 Izhevsk, ul. Universitetskaya 1, Udmurtiya State University, RCD; tel. (7-3412) 50-02-95, (7-095) 332-48-92; e-mail: subscribe@rcd.ru; URL: <http://shop.rcd.ru/>)

**Zvyagin V G, Dmitrienko V T** *Topological Approximation Approach to Problems in Hydrodynamics: the Navier–Stokes System* (Moscow: URSS, 2004) 112 pp. ISBN 5-354-00825-5.

Using the Navier–Stokes system as an example, this book describes the approaches to solving evolutionary and stationary problems in hydrodynamics by a method which approximates a given problem by a simpler one and proceeds from the concept of the degree of mapping as applied to infinite-dimensional spaces. The method has been presented repeatedly in Voronezh State University lectures on hydrodynamics given to undergraduate and postgraduate students at the Department of Mathematics and to audience in the VSU Science and Education Center ‘Wave Processes in Inhomogeneous and Nonlinear Media’. (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/>)

**Zaslavskii G M** *Physics of Chaos in Hamiltonian Systems* (Moscow–Izhevsk: IKI, 2004) 288 pp. ISBN 5-93972-342-x.

This book aims to acquaint the reader with the basic properties of the chaotic dynamics of Hamiltonian systems. It contains unique material on separatrix chaos, small-nonlinear chaos, and fractal kinetics, also featuring discussions on the Maxwell demon and the foundations of statistical physics. No special mathematical apparatus other than that usually employed in physics is used. The book is ideally suitable for all those actively involved in the problems of dynamical chaos. It will serve as an introduction to the world of Hamiltonian chaos for physicists, while at the same time acquainting mathematicians with topical problems in physics. Graduate and senior undergraduate students will also benefit from using the material of the book. (Institute for Computer Studies: 426034 Izhevsk, ul. Universitetskaya 1; tel./fax (7-3412) 50-02-95; e-mail: borisov@ics.org.ru; URL: <http://ics.org.ru/>)

**Shil’nikov L P, Shil’nikov A L, Turaev D V, Chua L** *Methods of Qualitative Theory in Nonlinear Dynamics* Part 1 (Moscow–Izhevsk: IKI, 2004) 416 pp. ISBN 5-93972-305-5.

The most comprehensive guide to date to the methods of nonlinear dynamics, this book discusses topics such as structural stability, the theory of bifurcations, invariant tori, and the central manifold theories. Along with classical results, the book discusses new methods, most of which were developed in Nizhni Novgorod within the precincts of the local ‘school of nonlinear dynamics’. It will be of interest and value for under- and postgraduate students in the fields of qualitative methods and dynamical chaos. (Institute for Computer Studies: 426034 Izhevsk, ul. Universitetskaya 1; tel./fax (7-3412) 50-02-95; e-mail: borisov@ics.org.ru; URL: <http://ics.org.ru/>)

**Quantum Radio Physics** A textbook (Ed. by V I Chizhik) (St.-Petersburg: SPb State University Publ., 2004) 689 pp. ISBN 5-288-02255-0.

The textbook is designed to be used within a program in ‘Quantum Radio Physics’ and contains material from a number of special courses which the panel of authors teaches at the Department of Physics at St.-Petersburg University. Highlighted in the text are those NMR and ESR aspects, both theoretical and experimental, which are used in the physical and chemical study of materials and in solving applied problems. The book is intended for postgraduate and senior undergraduate students in physics, chemistry, biology, and geology departments, and can be useful to professionals who are concerned with the molecular structure and motions in substances participating in various aggregate states. (SPb State University Publ.: 199034 St.-Petersburg, Universitetskaya nab. 7/9; tel. (7-812) 328-77-63; fax (7-812) 328-44-22; e-mail: books@dk2478.spb.edu; URL: <http://www.unipress.ru/>)

Compiled by *E V Zakharova* (e-mail: zaharova@ufn.ru)