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# New books on physics and related sciences

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**Deryugin E E** ***The Method of Relaxation Elements*** (Ed.-in-chief I I Naumov) (Novosibirsk: Nauka. RAS Siberian Branch company, 1998) 253 pp. Bibliography: 115 refs.

This book describes an effective method which allows analytical construction of plastic deformation fields with gradients in local volumes of solids; the corresponding stress tensor component distributions to be obtained, and plastic deformation localization (PDL) processes as well as those of material destruction to be simulated. The book presents the author's original analytical stress field expressions for PDL centers of various shapes (circle, ellipse, square, quadrangle, and a rectilinear strip at an arbitrary angle with the axis of extension). For engineers solving the applied problems with boundary element methods; for physicists engaged in modelling plastic deformation and the fracture of structurally inhomogeneous materials, and for engineers and college teachers concerned with the computation and simulation of such processes.Financially supported by the RAS Siberian Branch. (RAS Siberian Branch publishing, printing, and book-trade company 'Nauka' regular mail address: 630077 Novosibirsk, ul. Stanislavskogo 25)

**Anishchenko V S, Vadivasova T E, Astakhov V V** ***Nonlinear Dynamics of Chaotic and Stochastic Systems. Fundamentals and Selected Problems*** (Ed. by V S Anishchenko) (Saratov: Saratov State University Publ., 1999) 368 pp. Bibliography: 591 refs. RFBR project 98-02-30024.

This presentation of the fundamentals of nonlinear dynamics includes elementary theory of dynamic systems, the theory of instability and bifurcations, and the theory of deterministic chaos. While presenting recent research results — mainly from the collaboration with the Saratov State University Nonlinear Dynamics Laboratory — on the synchronization and control of chaos, reconstruction of dynamic systems, stochastic resonance, and synchronization of stochastic oscillations, this volume is also a useful textbook for undergraduate and post-graduate students and young university natural scientists involved in the study of nonlinear phenomena. (Saratov State University Publishing regular mail address: 410601 Saratov, ul. Universitetskaya 42)

**Bykov A D, Sinitsa L N, Starikov V I** ***Experimental and Theoretical Methods in the Spectroscopy of Water Vapor Molecules*** (General editor S D Tvorogov) (Novosibirsk: SO RAN Publ., 1999) 376 pp. Bibliography: 709 refs.

This book systematizes methods for the study of the fine structure of the vibration – rotation spectra of asymmetric-top- shaped molecules and illustrates their application to the real spectra of the $H_2O$ molecule and its isotopic varieties. The authors review current theoretical models of the molecular energy structure, including its highly excited vibration – rotation states. Special attention is given to the inverse spectroscopic problem and to how IR and optical absorption data on water vapor can be used to obtain quantitative data on its spectroscopic and molecular parameters. Also discussed are the line broadening problem and the line shift theory for the particular case of water vapor compressed by a buffer gas. The monograph covers both original studies performed in the period 1927 – 1998 and the authors' personal experience in high-resolution spectroscopy and in the development of high-precision theoretical methods. The authors' original studies covered in the book were supported by RFBR grants Nos 96-03-33801 and 98-05-27021. The book will be of wide interest to specialists in molecular chemistry, astrophysics and in other areas of chemistry, physics, and technology. It is also a valuable source of concrete numerical information for researchers in many areas of science. (SO RAN Publ. regular mail address: 630090 Novosibirsk, Morskoĭ prosp. 2)

**Lyubimov A, Kish D** ***An Introduction to Experimental Particle Physics*** (OIYaI, R1-98-231) (Dubna: OIYaI Publ., 1999) 330 pp. Bibliography: 5 refs. RFBR project 98-02-30014.

This book discusses particle physics from an experimentalist's perspective and therefore is mainly concerned the experimental fundamentals of the field. It traces the development of particle physics from the discovery of the electron to the experiments scheduled for the early years of the 21st century. Basic theoretical ideas are presented at a qualitative level, without cumbersome mathematics. The book's Appendix extends the traditional scope of the physics literature to discuss the significance of fundamental science in general and particle physics, in particular. The level of presentation is somewhat below that for the particle physics specialist, thus considerably extending the readership of the monograph. Intended primarily for physicists, physics students, engineers, programmers, and specialists working in the field, the book is also a valuable source for all those seriously interested in particle physics.

**Kiselev V F, Kozlov S N, Zoteev A V** ***Introductory Solid Surface Physics*** (Moscow: MSU Physics Department Publ., 1999) 284 pp., Bibliography: 70 refs.

This book examines electronic, atomic, and molecular processes in surface phases. Analyzing the interactions between these processes, it also discusses phenomena in space charge regions, the nature of surface electronic states, and dimensional effects. The book is based on lectures on various aspects of surface physics given by the authors to researchers and undergraduate and post-graduate students at the M V Lomonosov Moscow State University and other Russian universities as well as at several universities in Bulgaria, Germany, Netherlands, and Ukraine. More than

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simply a synopsis of the lectures, the book is designed to introduce the reader to the current ideas on the nature and mechanisms of a variety of processes occurring on free solid surfaces and solid – solid interfaces. Although the book is primarily intended for senior students, post-graduate students and researchers in physics, some of its chapters will be of interest to chemists, biophysicists, biochemists, and other professionals concerned with the physics and chemistry of solid surfaces. (MSU Physics Department contact phone number: (7-095) 939-5494; information is also available on the Internet at http://publish.phys.msu.su)

***Hydrodynamics and Safety in Nuclear Power Stations. Abstracts of papers of the nuclear power conference 'Thermal Physics 99' held on September 28-30, 1999 in Obninsk*** (Eds A D Efanov and P L Kirillov) (Obninsk: Academician A I Leĭpunskiĭ FÉI Publ., 1999) 348 pp.

Coverage includes the hydrodynamics of the fuel core, loop hydrodynamics, natural convection, hydrodynamics of two-phase flows, hydrodynamically excited vibrations, and hydrodynamics-related catastrophic failures. Brief accounts of the latest developments in the hydrodynamics and reliability of reactors and heat exchangers are also included. (A I Leĭpunskiĭ Physics and Power Institute regular mail address: 249020 Obninsk, Kaluga region, pl. Bondarenko 1)

***35 Years of NIIMÉ-Mikron: People and Events.*** Collection of memoirs and essays (Compiled by Yu S Fedorenko and O I Bochkin) (Moscow: Mikronprint, 1999) 280 pp.

This volume commemorates the 35th anniversary of the founding of the Molecular Electronics Research Institute, currently the public joint-stock company 'NIIMÉ and the Mikron Plant'. It features the memoirs of the company's veterans, official documents, and selected periodical press materials on Mikron and the 'Mikroners'. Documents and photographs from the archives of the company's museum and from the family archives of the contributors are also included. (Mikron-Print Publ. regular mail address: 103460 Moscow, Zelenograd, 'NIIMÉ and the Mikron Plant' Co.; tel. (7-095) 536-8359)

**Igoshin V I** ***Mikhail Yakovlevich Suslin 1894 – 1919*** (Scientific Biography Series) (Moscow: Fizmatlit, 1996) 160 pp. RFBR project 95-01-21090.

The first scientific biography of an untimely deceased mathematician whose publications, while taking a mere few pages in the book's Appendix (a short paper in the reports of the Academie des Sciences de Paris and two notes written and published by M Ya Suslin's colleagues after his death), contributed most strongly to the history of mathematics. For mathematicians and all those interested in the history of science. (RAS Physics and Mathematics Publishing regular mail address: 117071 Moscow V-71, Leninskiĭ prospect 15; tel.: (7-095) 952-4925, (7-095) 952-0746, tel/fax: (7-095) 955-0330, (7-095) 955-0314)

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