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New books on physics and related sciences

Malkovich R Sh Mathematical Theory of Diffusion in Semiconductors (St.-Petersburg: Nauka, 1999) 389 pp. Bibliography: 158 refs. RFBR project 95-02-07249.

Focusing on the mathematical analysis of atomic diffusion in solids, this book discusses general phenomenological aspects of the phenomenon and gives particular attention to semiconductors, where the interaction of ionized impurities and point defects with the electron – hole subsystem determines the specifics of the process. The book is intended for researchers in solid-state physics and physical chemistry as well as for practitioners involved in materials science and semiconductor device technology. (St. Petersburg RAN Nauka Publ. regular mail address: 199034 St.-Petersburg, Mendeleevskaya lin. 1)

Verkhoturov O P An Introduction to Computational Optics. Textbook (Novosibirsk: SGGA Publ., 1998) 273 pp. Bibliography: 86 references.

Written by a professor of the Chair of Optoelectronic Devices at the Siberian State Geodesic Academy, this monograph examines the calculation methods currently used for ordinary and scanning optical systems — in particular, mathematical models with gradient media and aspheric surfaces - and presents background theoretical information in geometrical optics. Using modern computer aids, the book discusses the properties of original components of optical systems and their synthesis from these components. Examples of such synthesis are offered and the design parameters of functionally diverse optical systems are considered. This manual is recommended by the Russian Federation Ministry of General and Professional Education as a textbook for undergraduate courses in optoelectronic devices and systems, laser technology and engineering, optical technologies and materials, and optical engineering. (SGGA Editorial Board regular mail address: 630108 Novosibirsk, ul. Plakhotnogo 10)

Lukin V P, Fortes B V Adaptive Formation of Beams and Images in the Atmosphere (General Ed. G G Matvienko) (Novosibirsk: SO RAN Publ., 1999) 214 pp. Bibliography: 217 refs.

This highly topical book on the theory of current atmospheric adaptive optical systems (AOS) is based on the authors' original work on the phase compensation of turbulent image blurring in telescopes and the minimization of the turbulent and thermal broadening of coherent beams via the phase matching of programmed phase correction. Special attention is given to how wavefront discontinuities affect the efficiency and stability of phase adaptive systems. The book also

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examines the AOS efficiency for vertical routes with a laser reference star as a buoy and image tremor compensation under laser buoying operation. For specialists engaged in adaptive optics research, in beam and image formation in a turbulent atmosphere, and in the numerical simulation of optical systems. (SO RAN Publ. regular mail address: 630090 Novosibirsk, Morskoĭ prosp. 2)

29th International Conference on the Physics of Charged Particle-Crystal Interactions (Moscow, 31 May-2 June 1999): Abstracts (Ed. by Prof. A F Tulinov) (Moscow: Moscow State University Publ., 1999) 160 pp.

This volume contains the abstracts of papers selected by the Organizing Committee for the conference held in Moscow from May 31 to June 2, 1999. (MSU Publ. regular mail address: 103009 Moscow, B. Nikitskaya ul. 5/7)

Spichak V V Magnetotelluric Fields in Three-Dimensional Geoelectric Models (Moscow: Nauchnyĭ Mir, 1999) 204 pp. Bibliography: 254 refs. RFBR project 98-05-78019.

Focusing on externally induced terrestrial electromagnetic fields, this monograph gives special attention to numerical simulation methods, and to the inversion of electromagnetic fields in three-dimensional media with due regard to *a priori* information and the noise level present. Coverage also includes new methods of three-dimensional medium visualization and electrical conductivity monitoring through the bounded region of an Earth crust using magnetotelluric data measured on the relief surface; and the geoelectric structure of a number of geographical regions (Transcaucasian region, Washington – Oregon subduction zone, the Kilauea volcano, the geothermal Minami-Kayabe zone, etc.). For specialists in geophysics and applied electrodynamics. (Nauchnyĭ Mir Publ. regular mail address: 119890 Moscow, ul. Znamenka 11/11).

Concise Encyclopedia of Energetic Condensed Systems (Ed.in-Chief Acad. B P Zhukov) (Moscow: Yanus-K, 1999) 596 pp. RFBR project 98-03-46016.

With this wide-ranging one-volume reference book on energetic condensed systems (ECS), the first of its kind in Russia, researchers and design engineers in various fields of science and technology now have essential information on the available technical capabilities and necessary data for project feasibility studies involving the use of ECSs in various and functionally diverse power plants and facilities. In over 500 entries, the book provides terminologically up-to-date, scientifically precise and technology oriented definitions of basic ECS class such as artillery and small-arms powders, solid rocket fuels, plasma fuels, pyrotechnical compositions, explosives and explosive mixtures. The dictionary contains data on the energy, ballistic, operating, and some other ECS characteristics and provides methodological approaches to ECS R&D and to other key problems, such as the chemistry of explosives, polymer chemistry, combustion and detonation theory, ballistics, and the basics of ECS design. The book also contains entries on the state-of-the-art in the ECS field and on the uses of ECSs in defense technologies and the national economy, including rocket engines, gas generators, pressure accumulators, MHD generators, fire-extinguishing aerosol generators, special-purpose cartridges, other power installations, fireworks, etc. With each item written by an acknowledged expert in his or her narrow field, it took more than 180 authors to compile the dictionary. This will be an important reference guide for a wide circle of specialists at research institutes, university departments and laboratories, design offices, industrial plants, military units, and mining industry. (Yanus-K Publ. contact telephone: (7-095) 252-1431)

Burakov V A Heat and Mass Transfer Phenomena for Two-Phase Flow Interaction with Materials (Tomsk: Tomsk University Publ., 1999) 280 pp. Bibliography: 345 refs.

This monograph examines novel physicomathematical models and results of numerical studies on mass and heat transfer phenomena arising when high-temperature, two-phase, sub-, trans-, and supersonic flows containing the combustion products of metallized solid fuels interact with ablating heat shielding materials which experience, in the process, the thermal, chemical, and mechanical influence of the precipitating, inertially condensed phase of the burning liquid agglomerates of both the active metal and its oxide particles. The operating conditions covered are those typical of the chambers, nozzles, and channels in current and potential power units. New physical and mathematical models are discussed and numerical simulation results presented. Financially supported by the Special-Purpose Federal 'Integration' Program and the Science and Technology F.T.492.98 Intercollege Program, the book is intended for engineers and researchers in aerospace technology and energetics as well for undergraduate and post-graduate students specializing in high-temperature mass and heat transfer. (TGU Publ. regular mail address: 634029 Tomsk, ul. Nikitina 4)

Aleksandrov A F, Rukhadze A A Lectures on the Electrodynamics of Plasma-Like Media (Moscow: MSU Physics Department Publ., 1999) 336 pp. Bibliography: 30 refs. Supported by the Special-Purpose Federal 'Integration' Program (project No. A-0111).

This book is a systematic presentation of the electrodynamics of electrically conducting and spatially dispersive ('plasmalike') media such as gaseous plasma, solid-state plasma (metals and semiconductors), colloidal and molecular crystals, conducting liquids (electrolytes, mercury), etc. Looking historically at the development of the field, the authors provide a comparative analysis of various models used to describe such media, and show the kinetic model to be the most complete. Coverage includes both linear and nonlinear electrodynamic properties of equilibrium and nonequilibrium and inhomogeneous systems. The worked solutions illustrating each of the topics are closely related to current physical problems rather than being of purely academic interest, and as such lead to a deeper understanding of the text material while at the same time developing the reader's practical skills for working in the field. The book is of interest to undergraduate students, post-graduates and researchers specializing in plasma physics, physical electronics, and solid-state physics. (MSU Physics Department contact phone number: (7-095) 939-5494; information is also available on the Internet at http://publish.phys.msu.su)

The books listed above are currently available in the library stock of the MSU Physics Department (lib@phys.msu.su)

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