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## New books on physics and related sciences

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Zabrodskii A G, Nemov S A, Ravich Yu I *Electronic Properties* of *Disordered Systems* (Executive Editors V I II'in, A Ya Shik) (A latest manual in the New Branches of Semiconductor Physics series) (St. Petersburg: Nauka, 2000) 72 pp. Bibliography: 12 refs. ISBN 5-02-024927-0.

This book is concerned with the electronic properties of disordered solids. The exposition of the physics of disordered systems is preceded by a concise review of the basic ideas underlying the percolation theory. The book examines metal-insulator transitions (Mott-Anderson transitions), describes the properties of the basic types of atomically disordered solids (alloys, amorphous materials, semiconductors with randomly scattered impurity atoms), and discusses methods for calculating the effective parameters of macroscopically inhomogeneous solids. Emphasis is placed on the electron energy spectrum and transport phenomena. The book was supported by the Russian Federation's 1997-2000 special-purpose 'State Support for the Higher Education-Basic Science Integration' program. Recommended by the RF Ministry of Education as a manual for students in applied physics, the handbook is intended for senior students in physics specialties as well as for those post-graduate students and researchers in solid-state physics and technology who want a better understanding of their field. (St. Petersburg RAS Nauka Publ. regular mail address: 199034 St. Petersburg, Mendeleevskaya lin. 1)

**Erofeev V I** *Wave Processes in Microstructured Solids* (Moscow: MSU Publ., 1999) 328 pp. Bibliography: 500 Refs. ISBN 5-211-04042-2.

This monograph provides a systematic presentation of the modern theory of the propagation and interaction of elastic waves in microstructured solids. The author poses mathematical models of solid bodies that take into account their microstructure, geometrical and physical nonlinearities, material defects, and deformation field-magnetic field coupling. The book examines various wave effects characteristic of bodies with microstructure and discusses the possibility of using these effects for the acoustic sounding of materials and structural elements. The monograph has been prepared as part of the special-purpose federal 'Integration' program and includes research from Nizhniĭ Novgorod University and RAS institutes (project A0047, section 0542 entitled 'Mechanics of Materials and Structures'). The work was supported by the RF President's Grant No. 98-15-96127. For specialists and undergraduate and post-graduate students in deformable solid mechanics, physical and engineering acoustics. (MSU Publ. regular mail address: 103009 Moscow, B. Nikitskaya ul. 5/7)

*Uspekhi Fizicheskikh Nauk* **171** (8) 911 (2001) Translated by E G Strel'chenko Getling A V Rayleigh-Benard Convection: Structures and Dynamics (Moscow: Éditorial URSS, 1999) 248 pp. Bibliography: 314 refs. ISBN 5-8360-0011-6. RFBR project 98-02-30009.

This monograph provides a systematic, yet concise description of the structures and dynamics of flows generated by thermal convection in a flat horizontal layer of fluid heated from below (Rayleigh-Benard convection). The evolution of such convective flows not only helps to see the essential features of various hydrodynamical instabilities but also reveals much about nonlinear structure-forming processes of various types. The book describes major methods for studying convection, discusses typical two- and three-dimensional flow regimes, and considers structural defects and convective regime crossover scenarios. Particular emphasis is placed on how various factors (mainly reducible to initial and boundary conditions) determine the shape and size of the vortex structures that form in the system. Thermal relaxation processes are discussed in detail using concepts such as a realizable flow and optimal (preferred) and realizable scales, and in so doing, the effects of order-disorder properties of the structure on its evolution are identified. The material is presented in a concise and self- contained manner with emphasis on the physical picture of the phenomena discussed. The book was originally published in English (Singapore: World Scientific Publ., 1998). The Russian edition differs little in contents, with only minor additions made and exposed misprints corrected. The book is intended for a wide range of readers, including specialists concerned with nonlinear phenomena, hydrodynamic instabilities, and other aspects of fluid and gas mechanics; researchers in thermal physics, astrophysics, atmospheric physics, and physics of the ocean, and anyone dealing with applied science disciplines dependent crucially on the understanding of heatand-mass transfer processes. Senior students in the listed topics will also find this an accessible textbook. (Éditorial URSS Publ. contact information: tel./fax (7-095) 135-4423, tel. (7-095) 135-4246; e-mail: urss@urss.ru)

Lavrent'ev A V, Shaposhnikova T L Solution of Complex Heat-and-Mass Transfer Problems Using Nonequilibrium Thermodynamics and Mathematical Physics (Krasnodar: KubGTU Publ., 1999) 168 pp. Bibliography: 194 refs. ISBN 5-230-21938-6.

This monograph examines mass transfer processes under the conditions of turbulent phase mixing and electrodialysis and discusses the MCVD (metal chemical vapor deposition) process used in preparing optical glass fiber feeds. For researchers, engineers, and post-graduate students engaged in solving complex heat-and-mass transfer problems. (Kuban' State Technological University Publ. regular mail address: 350072 Krasnodar, ul. Moskovskaya 2a)

Compiled by E V Zakharova