

## New books on physics and related sciences

DOI: 10.1070/PU2002v045n11ABEH001352

**Zubarev D N, Morozov V G, Reschke G** *Statistical Mechanics of Nonequilibrium Processes* Vol. 1 (Moscow: Fizmatlit, 2002) 432 pp. ISBN 5-9221-0211-7. RFBR project 01-02-30008.

This book is designed as a modern course in the statistical theory of nonequilibrium processes in classical and quantum many-particle systems. Unlike all other texts and monographs available on the subject, the theory of kinetic, hydrodynamic and relaxation processes is presented within the unified framework of the Gibbs method of statistical ensembles, as extended to nonequilibrium systems. The first volume introduces the method of nonequilibrium statistical ensembles, examines its applications to various problems in classical and quantum kinetics, and presents a theoretical discussion of the linear response of equilibrium systems to mechanical and thermal disturbances. The book is intended for research workers, senior undergraduates and post-graduate students engaged in the fields of theoretical physics, chemical physics, solid-state physics, plasma, gas and fluid studies. (Fizmatlit Publ.: 117864 Moscow, ul. Profsoyuznaya 90; tel.: (7-095) 334-7421; fax: (7-095) 334-7620; e-mail: fizmat@maik.ru; URL: <http://www.fizmatlit.ru/>)

**Vesnitskii A I** *Waves in Systems with Moving Boundaries and Loads* (Moscow: Fizmatlit, 2001) 320 pp. ISBN 5-9221-0172-2.

In this monograph, the physical and mathematical foundations of the dynamics of elastic systems with moving boundaries and loads are presented within the unified methodical framework of the theory of wave processes. The book treats qualitatively the various manifestations of the Doppler effect and the radiation of waves which uniformly moving loads produce in elastic tracks. It provides a detailed analysis of the ‘dynamic’ natural vibrations of moving-boundary systems with inseparable spacial and temporal components. The particular importance of these vibrations is that they are the only vibration modes that can exist freely in systems studied in the book. A qualitative theory of the parametric instability of the second order is developed having its origins in the normal Doppler effect. The book also presents a discussion on the transient radiation of elastic waves, which arises from the uniform straight-line motion of a mechanical object along the nonuniform elastic systems (strings, beams, membranes, and plates). The book is intended for research workers and undergraduate and post-graduate students in the fields of mechanics, and applied mathematics, as well as for practising engineers and designers engaged in the development of new technologies. (Fiziko-Matematicheskaya Literatura Publ.: 117071 Moscow V-71,

Leninskiĭ prospekt 15; tel.: (7-095) 952-4925, 955-0330; fax: (7-095) 955-0314; e-mail: fizmatlit@narod.ru; URL: <http://www.fizmatlit.narod.ru/>)

**Frank A M** *Discrete Models of an Incompressible Fluid* (Moscow: Fizmatlit, 2001) 208 pp. ISBN 5-9221-0190-0. RFBR project 01-01-14037.

The monograph examines a relatively new direction in computational hydrodynamics. Discrete incompressible fluid models are finite-dimensional models obtained directly from the variational principles of classical mechanics and intended for the numerical simulation of the motions of incompressible continuum. The book, in fact, demonstrates a new, unified approach to developing effective numerical methods for various classes of dynamic problems covering incompressible free-boundary fluid. Illustrative examples of calculations ranging from simple long-wave and soliton problems to three-dimensional free-boundary flows are discussed. The methods developed in the book enable the numerical modeling of certain nontrivial hydrodynamic effects, in particular the Mach reflection of solitary waves and a ball containment in a vertical jet of fluid. For specialists and undergraduate and post-graduate students in physics, mathematics, and mechanics. (Fizmatlit Publ.: 117864 Moscow, ul. Profsoyuznaya 90; tel.: (7-095) 334-7421; fax: (7-095) 334-7620; e-mail: fizmat@maik.ru; URL: <http://www.fizmatlit.ru/>)

**Kul'chin Yu N** *Distributed Fiber-Optic Measuring Systems* (Moscow: Fizmatlit, 2001) 272 pp. ISBN 5-9221-0072-6. RFBR project 00-01-14101.

This book introduces workers to the physical and engineering principles governing the operation of fiber-optic sensors as basic components of a new class of measuring devices — distributed information and measurement systems containing elements of artificial intelligence. The operation principles of basic fiber-optic sensor designs are described within a unified methodical framework. Valuable information on amplitude, polarization, phase and nonlinear fiber-optic sensors of lumped and distributed types is provided. Principles and schemes for integrating sensors into distributed measuring lines and systems are discussed. The distinguishing technological features of the distributed fiber-optic measuring systems of tomographic type are identified and described. Prospects for the application of teaching-playback neuron networks to processing signals from distributed fiber-optic measuring systems are examined. The book will be a much-needed and valuable addition to the field for a wide variety of professionals involved in optoelectronics. (Fiziko-Matematicheskaya Literatura Publ.: 117071 Moscow V-71, Leninskiĭ prospekt 15; tel.: (7-095) 952-4925, 955-0330; fax: (7-095) 955-0314; e-mail: fizmatlit@narod.ru; URL: <http://www.fizmatlit.narod.ru/>)

**Svetlitskiĭ V A** *Statistical Mechanics and the Reliability Theory* (Moscow: N É Baumann MGTU Publ., 2002) 504 pp. ISBN 5-7038-1772-2.

This book takes the reader more deeply into the major divisions of statistical mechanics and the foundations of the reliability theory and discusses their practical applications to the design of devices, machines, and constructions in a number of industries. It describes the theory of the stochastic vibrations of mechanical systems with a finite number of degrees of freedom and with distributed parameters. Coverage also includes numerical solution methods for applied statistical dynamics problems; theory and numerical methods for determining the reliability of structural elements, and nontraditional problems not amenable to methods of statistical dynamics. The content of the book corresponds to the author's course at the N É Baumann MSTU. It is designed primarily for technical university students. The book can also be of use to post-graduate students and mechanical engineers working in various branches of mechanical engineering industries. (N É Baumann MGTU Publ.: 107005 Moscow, 2-ya Baumanskaya 5; tel.: (7-095) 263-6045; fax: (7-095) 265-4298; e-mail: [press@bmstu.ru](mailto:press@bmstu.ru); URL: <http://www.press.bmstu.ru/>)

**Baskakov S I** *Lectures on the Theory of Circuits* (Moscow: Éditorial URSS, 2002) 280 pp. ISBN 5-8360-0206-1.

Material for an introductory course in the theory of circuits is presented systematically in accordance with the modern technical university syllabus. Topics considered include the methods of analysis of steady-state harmonic regimes of linear circuits, the theory of four-terminal networks, characteristics of frequency-selective circuits and filters, and the foundations of the theory of nonlinear circuits. Also presented are a detailed discussion on how to determine the response of a linear circuit to pulsed perturbations, the theory of circuits with distributed parameters, and methods for the synthesis of linear two-terminal networks. Computer-assisted calculations of complex circuits are covered in a separate chapter. For college and university students in radio engineering disciplines. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203 at the RAS Institute for System Analysis; tel./fax (7-095) 135-4423, 135-4246, e-mail: [urss@urss.ru](mailto:urss@urss.ru); URL: <http://www.urss.ru/>)

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