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New books on physics and related sciences

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Arkadov Yu K ***New Gas Ejectors and Ejection Processes*** (Moscow: Izd. Fiziko-Matematicheskoĭ Literatury, 2001) 336 pp. ISBN 5-94052-025-1.

This monograph describes many years of experience in developing gas-jet ejectors for various fields of engineering, including the gas and aircraft industries, experimental and industrial aerodynamics, and vacuum and ventilation technologies. The dominant bulk of the subject matter is devoted to describing new high-performance gas-jet ejector schemes and examines their development and application. The material of the book is based mainly on research carried out at the N E Zhukovskiĭ Central Aerohydrodynamical Institute, which also provided support for the publication. The book will be useful to scientists and research engineers engaged in the development and application of ejector engineering. (Fiziko-Matematicheskaya Literatura Publ.: 117071 Moscow, V-71, Leninskiĭ prosp. 15; tel.: (7-095) 952-49-25, 955-03-30; fax: (7-095) 955-03-14; e-mail: fizmatlit@narod.ru; website: http://www.fizmatlit.narod.ru/)

Chertov A G, Vorob'ev A A ***A Book of Physics Problems*** College manual. 7th revised and enlarged edition (Moscow: Izd. Fiziko-Matematicheskoĭ Literatury, 2001) 640 pp. ISBN 5-94052-032-4.

This problem book is designed to be in line with current physics programs for institutions of higher learning. Each section contains a large number of problems of increasing complexity. Basic laws and formulas are included in the beginning of each subsection together with typical problems solved, and the solutions to all problems are provided at the end of the book. The previous sixth edition of this book was published in 1997. The new edition includes more than 150 new problems and examples, extends the theoretical part of each the section, and is supplied with necessary corrections. For university and technical college students. (Fiziko-Matematicheskaya Literatura Publ.: 117071 Moscow, V-71, Leninskiĭ prosp. 15; tel.: (7-095) 952-49-25, 955-03-30; fax: (7-095) 955-03-14; e-mail: fizmatlit@narod.ru; website: http://www.fizmatlit.narod.ru/)

Chueshov I D ***Introduction to the Theory of Infinite-Dimensional Dissipative Systems*** (Khar'kov: Akta, 1999) 436 pp. ISBN 966-7021-23-8.

This book makes a comprehensive introduction to the basic ideas and methods of the novel and rapidly growing theory of infinite-dimensional dynamical dissipative systems. The examples considered cover systems generated by nonlinear partial differential equations which arise in various problems of modern continuum mechanics. The primary objective of the book is to help the reader in mastering the basic strategies used for studying infinite-dimensional dissipative systems, and to prepare him for independent research in the field. Specialists engaged in nonlinear dynamics will find here a systematic user-friendly presentation of the fundamentals of the subject. The core of the book is a set of courses the author has taught at the Mechanical Department of Khar'kov State University over a period of years. A large number of exercises are an important supplement to the main text. A basic knowledge of functional analysis and the theory of ordinary differential equations is a prerequisite. (Akta Science Publ.: 61145 Ukraine, Khar'kov, ul. Novgorodskaya 1; e-mail: we@acta.com.ua; website: http://www.acta. com.ua/)

Globus M E, Grinev B V ***Inorganic Scintillators: Novel and Traditional Materials*** (Khar'kov: Akta, 2001) 408 pp. ISBN 996-7021-24-6.

The monograph is concerned with inorganic scintillation crystals and consists of three parts. The first part describes novel (lutetium-based, in particular) scintillators, in which high detection capability is combined with high light yield and operation speed. For a number of crystals, spectrometric characteristics measured by a photomultiplier are compared with those obtained with an avalanche photodiode. Along with bulk crystals, thin single-crystal films on the base of activated oxide crystals are considered, which can be used for radioisotope and biological monitoring. In the second part, concerned with NaI(Tl), CsI(Tl), BGO, $PbWO_4$, and other widely used scintillators, the scintillation properties and electron processes dictating them are examined in more detail. Cutting-edge applications of these crystals in high-energy physics (scintillation modules for electromagnetic calorimeters) and nuclear medicine (position-sensitive diagnostic equipment) are discussed. In Part III, the performance parameters of these crystals are calculated, compared with available experimental data, and summarized in the tables as functions of the shape, size, optical parameters, and a degree of the reflecting surface roughness. (Akta Science Publ.: 61145 Ukraine, Khar'kov, ul. Novgorodskaya 1; e-mail: we@acta.com.ua; website: http://www.acta.com.ua/)

Mityushov E A, Berestova S A ***Theoretical Mechanics*** (Izhevsk: RKhD, 2001) 172 pp. ISBN 5-93972-067-6.

These lecture notes are intended for students of all forms of education taking a technical college course in theoretical mechanics. The content corresponds to a full course program and meets the Russian Federation's educational standards.

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The book will also be a useful reference guide for those seeking advanced technician qualification or those intending to work in the field. ('Regular and Chaotic Dynamics' Publ.: 426034 Izhevsk, ul. Universitetskaya 1; tel.: (7-3412) 78-39-33; website: http://www.old. rcd.ru/)

Vasil'ev V A ***Lagrange and Legendre Characteristic Classes*** ('New mathematical disciplines' Series) (Moscow: MTsNMO, 2000) 312 pp. Bibliography: 141 refs. ISBN 5-900916-41-3. RFBR project 98-01-14137.

This book focuses on developing a technique for constructing characteristic classes dual to special sets of differentiable mappings. Numerous coexistence relations for singularities or multi-singularities on a single manifold are proved. The book provides an introduction to symplectic geometry, contact geometry, and the theory of singularities. In the Supplement, written by M É Kazaryan, the results obtained in the book are interpreted in terms of and applied to the theory of equivariant homologies. The book was originally published in English by Gordon and Breach Sci. Publ. (New York), first in 1988 and then in 1993. For undergraduate and post-graduate students in mathematics and for professional researchers. (Publishing House of Moscow Continuous Mathematical Education Centre: 121002 Moscow, B. Vlas'evskiĭ per. 11; tel.: (7-095) 241-72-85; e-mail: biblio@mccme.ru; website: http://www.mccme.ru/)

Il'in V P ***Finite Difference and Finite Volume Methods for Elliptic Equations*** (Novosibirsk: SB RAS Institute of Mathematics Publ., 2000) 345 pp. Bibliography: 48 refs. ISBN 5-86134-087-0. RFBR project 00-01-14007.

This book systematically covers the general mathematical principles and algorithm-related aspects of the finite difference and finite volume methods as used for solving elliptic equations. It describes discretization algorithms for mixed boundary value problems in complex regions and examines basic theoretical questions of approximation, stability, convergence, and error estimation. Compact difference schemes of enhanced accuracy for solving differential equations with variable coefficients are investigated. The book presents methods for constructing balance approximations of various orders on triangular and quadrangular finite volumes. Also covered are modern net-point techniques, the structural, spectral, and monotonicity properties of algebraic equations, and direct and iterative methods for effectively solving high-order sparse-matrix systems. The book evolved from the lecture course taught by the author at Novosibirsk State University for many years. For undergraduate and post-graduate students and specialists in computational and applied mathematics. (S L Sobolev SB RAS Institute of Mathematics Publ.: 630090 Novosibirsk, prosp. Akad. Koptyuga 4; tel.: (7-3832) 33-04-81; e-mail: publ@math.nsc.ru; website:http://www.math.nsc.ru/publishing/publ.html)

Abramov A A ***An Introduction to Tensor Analysis and Riemannian Geometry*** University textbook ('MFTI Higher Mathematics Department lectures' Series) (Moscow: Izd. Fiziko-Matematicheskoĭ Literatury, 2001) 112 pp. ISBN 5-94052-039-1.

This book stems from a set of lectures given by the author to undergraduate students at the Moscow Physico-Technical Institute. It briefly summarizes the basic results from tensor algebra, tensor analysis, and Riemannian geometry and only assumes the knowledge of university-level mathematical analysis, linear algebra, and the theory of ordinary differential equations. Recommended as an undergraduate-level textbook on 'Applied Mathematics and Physics' specialty by the Educational and Methodical Board of the Moscow Physico-Technical Institute (State University). For students in mathematics, physics, and engineering, and for research scientists. (Fiziko-Matematicheskaya Literatura Publ.: 117071 Moscow, Leninskiĭ prosp. 15; tel.: (7-095) 952-49-25, 955-03-30; fax: (7-095) 955-03-14; e-mail: fizmatlit@narod.ru; website: http://www.fizmatlit. narod.ru/)

Arnol'd V I, Kozlov V V, Neĭshtadt A I ***Mathematical Aspects of Classical and Celestial Mechanics*** (Moscow: Éditorial URSS, 2002) 416 pp. ISBN 5-8360-0326-2.

This book outlines the basic principles, problems, and methods of classical mechanics. The major emphasis is on the mathematical aspects of the subject matter. The authors discuss the mathematical models of the motion of mechanical systems, examine various theoretical aspects of the order reduction approach to symmetric systems, review the most general and effective methods for integrating equations of motion, and investigate qualitative aspects of the phenomena that prevent the total integrability of Hamiltonian systems. Coverage also includes variational methods for finding periodic and asymptotic motions, the general theory of tensor invariants of the equations of dynamics, and finally, the most effective branches of classical mechanics — perturbation theory and the theory of vibrations. To illustrate general results, numerous examples from celestial mechanics and dynamics of rigid bodies are given. For undergraduate and post-graduate students, researchers, and teachers in mathematics, mechanics, physics, and related areas of science. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203: RAS Institute for System Analysis; tel./fax (7-095) 135-44-23, 135-42-46, e-mail: urss@urss.ru; website: http://www.urss.ru/)

Komissarova L N ***Inorganic and Analytical Chemistry of Scandium*** (Moscow: Éditorial URSS, 2001) 520 pp. RFBR project 98-03-46024.

This monograph brings together information on the composition, structure and individual properties of the main groups of inorganic scandium compounds (intermetallides, oxygen-free binary compounds such as halogenides, rhodanides, etc., complex oxides, hydroxides, peroxides, carbonates, nitrates, phosphates and phosphites, vanadates, sulfates and sulfites, and compositionally similar compounds with Se, Te, Cr, Mo, and W derivatives as anions). Various kinds of organic scandium derivatives used in analytical chemistry are presented, some of which are useful for producing luminescent materials. The states of scandium ions in water solutions, the stability of cation and anion forms, and methods for scandium separation from cations of various types are analyzed. Coverage of analytical chemistry includes gravimetry, complexometry, spectrometry, fluorometry, oxidimetry, electrochemistry, spectral analysis, and activation analysis.

The sections on spectral and activation analysis techniques present optimal decomposition processes using the combination of scandium with diverse elements, and examine processes for preparing scandium compounds in forms solvable in various media. This part of the book complements the section covering the methods of scandium separation from various cations. A brief account of the discovery of scandium is given, and concise information on geochemistry, newly discovered domestic minerals and raw material resources, and scandium extraction technologies is presented. The book will be of interest to undergraduate and post-graduate students and to scientists and practising engineers at the research institutes, universities, academies, and industrial enterprises of various kinds, including private companies. (Éditorial URSS Publ.: 117312 Moscow, prosp. 60-letiya Oktyabrya 9, office 203: RAS Institute for System Analysis; tel./fax (7-095) 135-44-23, 135-42-46, e-mail: urss@urss.ru; website: http://www.urss.ru/)

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