

PACS number: 01.30.Tt

New books on physics and related sciences

DOI: 10.1070/PU2000v043n04ABEH000767

Konoplev V A ***Algebraic Methods in Galilean Mechanics*** (St. Petersburg: Nauka, 1999) 288 pp. Bibliography: 52 refs. ISBN 5-02-024866-5

Providing an algebraic foundation for Galilean mechanics, this monograph fully dispenses with the idea of discreteness of 'analytical' mechanics and considers instead a real, totally disconnected and locally continuous medium evolved from rotating and deformable 'particles'. The primary properties of the Galilean mechanics of the Universe are formulated in terms of density balance axioms on vector and scalar measures in six dimensions, leading to a fundamentally new architecture of Galilean mechanics as a geometry of the generalized Galilean group. For mathematicians and specialists in mechanics. (St. Petersburg RAS Nauka Publ. regular mail address: 199034 St. Petersburg, Mendeleevskaya lin. 1)

Samarskiĭ A A, Vabishchevich P N ***Numerical Methods for Convection and Diffusion Problems*** (Moscow: Éditorial URSS, 1999) 248 pp. Bibliography: 174 refs. RFBR project 98-01-14116.

This volume discusses basic numerical methods for solving the convection – diffusion problems. Finite-difference and finite-element discrete models are developed, and monotonic difference schemes are constructed for problems with divergent and nondivergent convective transfer. Approximate solutions to nonself-conjugate, elliptical net problems are obtained using iteration methods. Based on the general stability (correctness) theory of the operator-difference scheme, this book investigates unsteady convection – diffusion problems. Also considered is the potential of additive space-variable-split difference schemes. Intended primarily for specialists in computational physics and numerical continuum mechanics simulation, the material is also readily accessible to senior students in applied fields. (Éditorial URSS Publ. contact information: tel./fax (7-095) 135-4423, tel. (7-095) 135-4246, e-mail: urss@urss.isa.ac.ru)

Shalashilin V I, Kuznetsov E B ***Solution Continuation in Parameter and Optimal Parametrization in Mathematical and Mechanical Applications*** (Moscow: Éditorial URSS, 1999) 224 pp. Bibliography: 119 refs. RFBR project 98-01-14030.

This book discusses and provides a justification for solution continuation in an optimal parameter as a method for solving various classes of problems with a one-parameter set (i.e. a curve) as the solution. Coverage includes nonlinear problems with a parameter and the Cauchy problem for ordinary differential equations (ODEs) (stiff ones, in particular), as well as for integro-differential equations and differential algebraic equations. Important consideration is given to the interpolation and approximation of curves. Nonlinear boundary-value ODE problems and solutions near singular points are also analyzed. This book is for researchers, engineers, and undergraduate and post-graduate students in the fields of computational mathematics, applied mathematics, and mechanics. (Éditorial URSS Publ. contact information: tel./fax (7-095) 135-4423, tel. (7-095) 135-4246, e-mail: urss@urss.isa.ac.ru)

Kidibaev M M ***Radiation -Induced Processes in*** **(Li, Na)F-U, Me** ***Crystals*** (Karakol, Ekaterinburg: IGU – UGTU Publ., 1999) 220 pp. Bibliography: 394 refs.

This monograph records the results of a study of the radiation-induced properties of (Li,Na)F-U,Me crystals performed by the author and his colleagues at the Kyrgyz National Academy of Sciences Institute of Physics in Bishkek and at Issyk-Kul' State University in Karakol, also Kyrgyzstan, in cooperation with a Ural State Technical University group. The materials investigated are increasingly finding uses in ionizing radiation detectors and as components of opto-electronic devices. The book is intended for researchers and undergraduate and post-graduate students in disciplines involving the optical and EPR spectroscopy of crystals; color center lasers; radiation in solids, and ionizing radiation detection systems. (UGTU Publ. regular mail address: 620002, Ekaterinburg, ul. Mira 19).

Arsen'ev S A, Pokazeev K V, Shelkovnikov N K ***Nonlinear Waves on Water. Textbook*** (Moscow: MSU Physics Department Publ., 1998) 134 pp. Bibliography: 67 refs.

This textbook discusses strongly nonlinear waves on water, a widespread phenomenon appearing in nature in such diverse forms as tsunami, rising tides, pressure ridges and troughs, unsteady sea currents, seashore storm waves, high water and flood waves in river estuaries, as well as wind waves and ripples in the coastal regions of the ocean. Unlike the mathematical monographs currently available, this book gives special attention to the physics of wave phenomena. The major emphasis is on experimental testing of the solutions obtained for the geophysical hydrodynamics equations, for which both *in situ* and laboratory data are employed. The book draws on the authors' research at the MSU Physics Department and the RAS Institute of the Physics of the Earth and is supported by the Federal Special-Purpose 'Integration' Program through Grant No. 2.1-304. For those with interests in planetary geophysics, hydromechanics, oceanology, navigation, and shipbuilding. (MSU Physics Department Publ. regular mail address: 119899 Moscow, Vorob'evy gory, M V Lomonosov MSU, Physics Department)

Uspekhi Fizicheskikh Nauk **170** (4) 471 – 472 (2000)
Translated by E G Strel'chenko

Studies in the History of Physics and Mechanics, 1995 – 1997 (Ed.- in-Chief G M Idlis) (Moscow: Nauka, 1999) 286 pp.

Part I of this collection contains the proceedings of a jubilee conference which was held at the S I Vavilov Institute of the History of Science and Technology, Moscow, in 1997, to commemorate the 200th anniversary of the birth of the French physicist and engineer Sadi Carnot. F L Grimberg draws a fiction-style picture of the world in which Carnot and his father lived and worked, and V P Vizgin describes the scientific background of the time. The remaining papers in this part examine S Carnot's own work and analyze the ties with his predecessors and subsequent generations' attitude to his ideas. The second part, 'All about Cosmology,' brings together historical studies ranging from the ideas of ancient astronomers and philosophers to the most recent cosmological achievements, including both scientific and theological aspects. Part III provides biographical sketches of L L Kul'vetsas, G Lamé, and A A Eichenwald. In Part IV, 'Miscellaneous Physics,' along with traditional historical and scientific issues, those related to the so-called active history of science are discussed by G V Ryazanov and S D Khaĭtun. Abstracts of all the contributed papers in both Russian and English are presented at the end of the book. For specialists in physics and mathematics and for those interested in the history of science. (Nauka Publ. regular mail address: 117864 GSP-7, Moscow V-485, Profsoyuznaya ul. 90)

Stechkin S B ***Selected Works in Mathematics*** (Moscow: Fizmatlit, 1998) 384 pp. RFBR project 98-01-14098.

This collection of the works of Professor Sergeĭ Borisovich Stechkin (1920 – 1995) spans the full breadth of his mathematical research, including the theory of approximation of functions, trigonometric and orthogonal series, approximation of unbound operators, extremum problems, the geometrical problems of approximation theory, and the theory of numbers. Fragments of his applied studies on external ballistics appear here for the first time. The book also presents a list of S B Stechkin's works (116 items) and an index of books published under his editorship (12 items). Commentaries at the end of the book place each work in perspective and describe the subsequent development of the subject. Some aspects of S B Stechkin's work may be found comprehensively reviewed in the memorial issues of the journals *Advances in Mathematical Sciences* (Vol. 51, June 1996) and *Fundamental and Applied Mathematics* (Vol. 3, April 1997). (RAS Physics and Mathematics Publishing regular mail address: 117071 Moscow V-71, Leninskiĭ prospect 15)

Gubarev V S ***Farewell to the 20th Century. Fate of Science and Scientists in Russia*** (Moscow: Nauka/Interperiodika, 1999) 512 pp. Supported by the RFBR and the NEKOS agency.

Intended for a wide range of readers and based on a science journalist's personal encounters and conversations with outstanding Russian scientists, this book commemorates the 275th anniversary of the Russian Academy of Sciences, which was celebrated on the eve of the millennium. A broad panorama of Russian science in the latter half of the 20th century is presented through the dramatic fates of those who pioneered the conquest of space, harnessed the atomic nucleus, plumbed the depths of the cell, and retrieved the past from nonexistence. (MAIK Nauka/Interperiodika regular and electronic mail addresses: 117864 GSP-7, Moscow V-485, Profsoyuznaya ul. 90; e-mail: compmg@maik.rssi.ru)

30 years of Andreĭ Sakharov's 'Reflections...' (Moscow: Prava Cheloveka, 1998) 232 pp.

A collection of lectures and speeches from a conference which was held at the Museum and Public Center for Peace, Progress, and Human Rights on May 19-20, 1998, to commemorate the 30th anniversary of Andreĭ Sakharov's *Reflections on Progress, Peaceful Coexistence, and Intellectual Freedom*. (Prava Cheloveka Publ. regular mail address: 119847 Moscow, Zubovskiĭ bulvd. 17)

Lomonosov. Concise Encyclopedic Dictionary (Complied and edited by É P Karpeev) (St. Petersburg: Nauka, 1999) 259 pp. Russian Scientific Foundation for Humanities project 99-03-16135.

Beginning with a chronology of M V Lomonosov's key biographical data with references to particular entries, the dictionary reduces to a minimum information about the lives of people mentioned and focuses instead on their contacts with Lomonosov. The concluding essay 'Ecce homo' (Behold the man!) by É P Karpeev offers a psychological portrait of the great man. According to the authors, the book provides a survey of the current state of Lomonosov studies, but so briefly that it does not remove the problem of preparing a full-scale Lomonosov's Encyclopedia. (St. Petersburg RAS Nauka Publ. regular mail address: 199034 St. Petersburg, Mendeleevskaya lin. 1)

Compiled by *E V Zakharova*