
REVIEWS

MATHEMATICAL EXOTICS AND RADIATION EFFECTS (BIBLIOGRAPHIC REVIEW)

The book stock of Information and Library Center in Tyumen State University is replenished by monographs of Russian and foreign scholars, collections of scientific articles, problem books on physics and mathematics. Fundamentals of nonlinear dynamics, the concepts of determinism, periodic and chaotic oscillations, reconstruction of dynamic systems and diagnostics mode on the experimental data are considered and presented in the study of V.S. Anischenko, Head of Department of Physics and Nonlinear Dynamics, Saratov State University (*Introduction to Nonlinear Dynamics* [1]). The author of this unconventional research was the first to introduce the concept of 'mathematical exotics' into scientific use.

A significant number of new publications in TSU book stock are dedicated to the analysis and development of physical processes in the light of present knowledge achievements. Among them is the collective monograph by K.I. Tapero, V.N. Ulimova and A.M. Tchlenova *Radiation effects in silicon integrated circuits for space application* [2]. The authors examine the effect of ionizing radiation on the characteristics of micro- and nanoelectronics units. Priority is put on cosmic radiation and external radiation exposure in the process of nuclear explosions and production cycles in nuclear power plants. Apart from that, the monograph addresses experiments with protons and ions accelerators, and the main parameters of semiconductor devices and chips sensitivity to the 'centers' of cosmic radiation. This scholarly edition is aimed primarily at experts in electronics. However, it may be of particular interest to those who deal with radiation and near-Earth space.

Classical physical concepts and quantities are also paid attention to by contemporary researchers. An example of this is the work of E.N. Andreyev, Assistant Professor of Altai State Technical University named after I.I. Polzunov (*Errors in Classical Theory of Gravitation* [3]). E. Avdeyev, a graduate of Moscow Aviation Institute, tried to make adjustments to gravitational coefficients of the Earth and Moon. He argues that they "are not constant in the classical sense of the word, but conventionally approximate". To confirm this deduction the author sets a little-known but real fact: "every year the Moon moves away from the Earth by 2 centimeters, while the gravitational coefficient of the Moon is 0.73% less than the gravitational coefficient of the Earth."

It is common knowledge that physics is closely related to astronomy. In this respect we should take note of an interesting monograph by V.G. Surdin, leading researcher of Astronomic Institute named after P.K. Sternberg, *Exploration of Far-Out Planets*

[4]. The author traces the planet paths against the background of stars and considers the map of the solar system and its surroundings, as well as gives physical and technical data and astronomical coordinates of nine planets and 88 constellations.

Among the new publications in the exact sciences two books attract particular attention. They deal with unique laser radiation. The first book *The Laser Odyssey* [5] is written by Theodore Maiman (1927-2007), the creator of the first ruby laser and the second—*The History of the Laser* by Mario Bertolotti [6], Doctor of physics in University of Rome ‘La Sapienza’. It should be noted that the work of the Italian scientist immortalized the names of Russian scientist, such as A. Prokhorov and N. Basov, Nobel Prize winners in the field of ‘laser problems’ solutions.

Fairly enough a new branch in present-day exact science is attributed to nanotechnologies, which go hand in hand with classical mechanics and electromagnetic structure. I.P. Suzdalev, Doctor of Physics and Mathematics, Professor of Lomonosov Moscow State University, Head of Physics and Chemistry of Nanoclusters and Nanostructures Laboratory, Institute of Chemical Physics named after N.N. Semenov, RAS, wrote a monograph *Electrical and magnetic transitions in nanoclusters and nanostructures* [7]. He devoted his research to the analysis of transitions in systems ‘metal–insulator’ and ‘magnetic–paramagnetic’, as well as to the study of metamaterials, giant magnetoresistance and prospects of metamaterials development.

One more reputable work is the monograph by Professor Yu.N. Tumanov *Plasma high-frequency, microwave and laser technology in chemical and metallurgical processes* [8], devoted to the study of new modern technologies within the close contact of physics, chemistry, nanotechnologies under the application of technological plasma, radio-frequency fields and lasers in the production of nuclear fuel cycle, and rare earth metals. It should be noted that the author dedicated a separate section to the integration of nuclear power in the Russian Federation into the world energy production in the early twenty-first century.

Special attention should be paid to new publications containing the solution of various problems in the course of physical processes improvement. Among them there is a monograph *Problems in elasticity of non-smooth spaces theory* [9] by Professor A.M. Khludnev, leading researcher, Lavrentyev Institute of Hydrodynamics, Siberian Branch of RAS. This special-purpose research studies the issues of equilibrium of elastic bodies containing cracks with nonlinear boundary conditions in the mechanics of deformable solid bodies.

A collection of research and review works *Various aspects of N-body problem* [10] deserves special mention. It is compiled by A.V. Borisov, a research associate from the Institute of Computer Science, Udmurtia State University, and A. Chenciner, a research associate from the Institute of Gravitational Astronomy, University of Paris. The work contains the solution to the problem of very small mass-bodies stability using the methods of real algebraic geometry and computer algebra.

These and other new publications in mathematics and physics from the book stock of Information and Library Center are intended for University professors and students, for everyone interested in present-day scientific achievements.

REFERENCES

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I. I. Ermakov,
Bibliographer
Research and Bibliography Department
Information and Library Center, TSU
libibo@utmn.ru
тел (3452)456025