

## New books on physics and related sciences: June 2025

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**Ivanov I.P., Shavrov V.G., Shcheglov V.I. *Waves in multilayer structures*. Pt. 4. *Dynamic chaos in a system of two coupled oscillators*. (Moscow: Fizmatlit, 2024) 488 pp. ISBN 978-5-9221-1998-6.**

The monograph presents methods for analyzing nonstationary and chaotic phenomena occurring in a system of two coupled oscillators. High-frequency oscillations of a magnetostrictive transducer and the self-modulation nature of noise oscillations in a ferrite disc placed in an electrodynamic resonator are taken as the physical basis for consideration. Various modes of self-modulation and chaotic oscillations are noted, including the effect of nonstationary delay, giant oscillations, and high-frequency accompanying oscillations. A model of dynamic potential is introduced to interpret the observed phenomena. Some applied problems are considered. Many examples are provided and methodological recommendations for students' independent work are given. The monograph is intended for specialists working in the field of physics of wave processes, electrodynamics, magnetic phenomena, and acoustics, for engineers and designers of microwave, optical, and acoustic equipment, as well as for students and postgraduates of corresponding specialties (Fizmatlit Publishers: tel. +7 (495) 005-32-79; URL: <http://www.fml.ru/>, <https://www.fmlib.ru/>).

For **V.G. Shavrov's** papers in the journal *Physics–Uspekhi*, see <https://ufn.ru/en/authors/72/shavrov-vladimir-g/>

**Masevich A.G., Tutukov A.V. *Star evolution: theory and observations*. 2nd edition, revised (Moscow: URSS, 2025) 280 pp.**

The main results are presented of the evolution of single and binary stars of different masses from their birth to transformation to a white dwarf, a neutron star, and a black hole. The main trends of the star evolution theory are outlined, and promising applications of this theory to the theory of evolution of stellar clusters and galaxies are mentioned. Particular attention is paid to comparing models with observations in the optical, infrared, X-ray, and ultraviolet ranges of star spectra at various stages of evolution. The main unsolved problems are noted. The book is intended for astronomers, physicists, and advanced readers of related specialties interested in state-of-the-art star evolution issues. (Publishing group URSS: e-mail: [urss@URSS.ru](mailto:urss@URSS.ru), URL: <https://urss.ru/>).

For **A.V. Tutukov's** papers in the journal *Physics–Uspekhi*, see <https://ufn.ru/en/authors/31836/tutukov-aleksandr-vasilievich/>

**Demin V.G., Kosenko I.I., Krasil'nikov P.S., Furta S.D. *Selected problems of celestial mechanics*. Tutorial. 2nd edition, revised (Ser. University Textbooks and Tutorials, Ed. by P.S. Krasil'nikov) (Moscow–Izhevsk: Institute of Computer Science, 2024) 270 pp. ISBN 978-5-4344-1037-3.**

The textbook is devoted to three classical problems of celestial mechanics: the two-body problem, the problem of two immobile centers, and the limited three-body problem, including its limiting version — the Hill problem. The book differs from existing celestial mechanics textbooks: without claiming to be complete, the authors strictly describe classical and modern results providing deeper insight into the motion of celestial bodies within the framework of traditional models of celestial mechanics. The book presents methods for integrating equations of the problem of two bodies, two immobile centers. In the non-integrable three-body problem, the main focus is on various forms of representation of the equation of motion, the study of stationary solutions, the application of ergodic theory methods, and proof of the nonintegrability of this problem. An elementary introduction to perturbation theory, the theory of elliptic functions, and the theory of reversible systems is presented. The book contains a large number of drawings. The textbook is intended for students at and postgraduates of universities and technical high schools, learning mathematics, mechanics, and applied mathematics. (Publishing House of technical literature, Institute of Computer Science, e-mail: [mail@rcd.ru](mailto:mail@rcd.ru), URL: <https://shop.rcd.ru/>)

**Kolokolov I.V., Kuznetsov E.A., Mil'shtein A.I., Podivilov E.V., Chernykh A.I., Shapiro D.A., Shapiro E.G. *Problems in mathematical methods in physics*. 6th edition, revised (Moscow: URSS, 2025) 352 pp.**

The proposed collected problems are the result of 15 years of experience of teaching using a new approach to mathematical methods in physics at the Physical Department of Novosibirsk State University. The book contains over 350 problems on equations in partial derivatives, special functions, asymptotical methods, the Green's function method, integral equations, the theory of finite groups, Lie groups, and their application in physics. The book is recommended for students, postgraduates, and teachers of physical and physico-technical specialties. Many problems are supplied with detailed solutions and answers are given to all the problems. The textbook may also be useful for self-education. (Publishing group URSS: e-mail: [urss@URSS.ru](mailto:urss@URSS.ru), URL: <https://urss.ru/>).

For papers by **E.A. Kuznetsov** and **A.I. Mil'shtein** in the journal *Physics–Uspekhi*, see <https://ufn.ru/en/authors/812/kuznetsov-evgenii-a/> and <https://ufn.ru/en/authors/32927/mil-stein-aleksandr-ilich/>

**Markeev A.P.** *Theoretical mechanics*. 5th edition, rev. and sup. (Ser. Mathematic sand Mechanics (Moscow–Izhevsk: Institute of Computer Science, 2024) 712 pp. ISBN 978-5-4344-1025-0.

The book is a rigorous, comprehensive, and compact presentation of the main problems and methods of theoretical mechanics. It differs significantly from existing textbooks on theoretical mechanics both in the selection of material and in the way it is presented. The main emphasis is on the consideration of the most informative sections of dynamics and methods of analytical mechanics valuable for the theory and applications. The book is intended for students of mechanical and mathematical departments at universities and for students at technical higher schools learning mathematics and mechanics, for teachers of mechanics, and for postgraduates. It is recommended by the Scientific and Methodological Council for Theoretical Mechanics under the Ministry of Education and Science of the Russian Federation as a textbook for students of higher educational institutions studying in the area of training and in the specialties of Mathematics and Mechanics. (Publishing House of Technical Literature, Institute of Computer Science, e-mail: [mail@rcd.ru](mailto:mail@rcd.ru), URL: <https://shop.rcd.ru/>)

**Shaskol'skaya M.P.** *Crystallography*. 3rd edition, stereotyp. (Moscow: URSS, 2025) 384 pp.

The book is aimed at training specialists who would be able to purposefully grow crystals with the desired properties, and to investigate, evaluate, and apply these crystals, for which an active mastering of mathematical apparatus of crystallography and crystal physics is required. The book contains elements of classical crystallography and selected sections of crystal physics. Engineering methods are also given for calculating the physical properties of crystals and information on their application in modern technology. The first chapter is devoted to the symmetry of the outer forms of crystals. The second chapter considers the symmetry of crystal structure: the Bravais lattice, elements of symmetry of crystal structures, space groups, symbols, and the main facts concerning experimental determination of crystal structures. The third chapter presents some of the main questions of crystal chemistry, with particular attention paid to the connection of the changes in the crystal structure with its physical and chemical properties. Given in the fourth chapter is an exhaustive description of the physical properties of crystals: the correlation between physical properties and various phenomena occurring in crystals is considered. Mechanical properties and plastic deformation of crystals are described in detail in chapter five. Crystal growth, which is the key problem for crystallographers, is considered in chapter six. Also described are conditions and possibilities for crystal growth from vapors, solutions, and melts, as well as conditions and possibilities of recrystallization from various crystal phases. Furthermore, this chapter provides the main information on crystal growth, on equilibrium and real crystal forms, on macroscopic defects, on normal and

twinned crystal growth, and on epitaxy. The book ends with a review of crystal growth from vapors, solutions, and melts and summarizes the teaching experience at the Department of Crystallography of the Moscow Institute of Steel and Alloys, which trains engineers specializing in the field of semiconductor and dielectric materials, rare and nonferrous metals, and physical and chemical methods for studying materials of electronic engineering. (Publishing group URSS: e-mail: [urss@URSS.ru](mailto:urss@URSS.ru), URL: <https://urss.ru/>).

For papers by **M.P. Shaskol'skaya** in the journal *Uspekhi Fizicheskikh Nauk* (in Russian), see <https://ufn.ru/ru/authors/10976/shaskol-skaya-m-p/>

**Yazenin A.V., Bresler I.B., Soldatenko I.S.** *Possibility-probability calculations: Basic concepts. Calculus of possibility. Fuzzy random quantities. Problems and solutions*: Textbook (Moscow: Fizmatlit, 2025) 112 pp. ISBN 978-5-9221-2002-9.

The textbook is aimed at an in-depth, practically-oriented study of the fundamentals of possibility theory with an emphasis on representation, aggregation, and processing of expert knowledge with elements of possibility-probability hybrid uncertainty and its application in optimization and decision-making problems. The textbook is intended for developers of intelligent information systems for decision-making support based on soft computing technologies, for students and teachers of specialist programs and graduate courses, as well as for postgraduate students of mathematical, technical, and economic specialties and areas of training. Reviewers: Head of the Department of Mathematical Statistics of M.V. Lomonosov Moscow State University (MSU), Doctor of Physical and Mathematical Sciences, Professor V.Yu. Korolev; Professor of the MSU Department of Mathematical Statistics, honorary worker of higher education of the Russian Federation, doctor of physical and mathematical sciences, Professor Yu.S. Khokhlov, laureate of the Russian Presidential Prize in Education, honorary worker of science and high technologies of RF, Professor of the Department of Applied Mathematics and Artificial Intelligence at the National Research University “Moscow Power Engineering Institute” (MPEI), doctor of technical sciences, Professor A.P. Ereemeev. (Fizmatlit Publishers: tel. +7 (495) 005-32-79; URL: <http://www.fml.ru/>, <https://www.fmlib.ru/>)

**Bazhenov A.N., Zhilin S.I., Kumkov S.I., Sharyi S.P.** *Processing and analysis of interval data*. (Ser. Interval Analysis and Its Applications) (Moscow–Izhevsk: Institute of Computer Science, 2024) 356 pp. ISBN 978-5-4344-1018-2.

The book presents methods of processing the results of measurements and observations, which are inexact and have an interval uncertainty, whereas the conditions of application of the probability theory are not met, and no probabilistic characteristics of the uncertainty are present. In such situations, the standard statistical methods based on the theoretical probabilistic inaccuracy model can be applied only formally. The proposed approaches to the analysis of interval data are based on the methods of interval analysis and related disciplines and rely on the use of specialized program means for computers. The book presents a self-consistent system of concepts and terms of a new discipline — the interval analysis of data — and its application for solving

information processing problems is illustrated with concrete examples. (The Publishing House of Technical Literature, Institute of Computer Science, e-mail: mail@rcd.ru, URL: <https://shop.rcd.ru/>)

**Shadskii A.S., Morozov E.M., Zhekov K.N., Plotnikov A.S.** *ANSYS in the hands of an engineer: temperature voltages*. Stereotype Publishers (Moscow: URSS, 2025) 480 pp.

The book presents the sequence of actions while working with the ANSYS program to solve the problems of heat conduction, thermoelasticity, and thermoplasticity. Solutions are given in both connected and disconnected statements. The corresponding commands with explanations are presented. A detailed step-by-step solution to several concrete problems is adduced to obtain the main habits of work with the program in both interactive and command regimes. The corresponding macros are given. The book is planned for senior students, postgraduates, engineers and technical workers and specialists interested in mastering the techniques of work with a computer complex in the field of heat engineering and thermal durability. (Publishing group URSS: e-mail: urss@URSS.ru, URL: <https://urss.ru/>).

**Sharkov A.M.** *How the World Ocean is investigated*. 2nd edition revised and supplemented (SPb.: Nauka, 2024) 231 pp. ISBN 978-5-02-040275-1.

In language accessible to an unprepared reader and in a lively, entertaining form, the book talks about hydrography, one of the most complex specialties involved in the study of the World Ocean. The methods are explained and the technical means of studying the World Ocean are described using examples of famous historical events. The main stages of studying the bottom relief and sea soil, creating a marine navigation chart, searching for and identifying sunken objects, and other work being done by hydrographers are revealed. The format of an introductory conversation chosen for material presentation makes it possible to avoid formulas, algorithms, and rules. It is for the first time that hydrography is described not as a complex profession, but as an exciting activity (Nauka Publishers: e-mail: info@naukaran.com, URL: <https://naukabooks.ru/>)

**Kraïneva I.** *Time and space of Yuri Rumer*. (Novosibirsk: Publishing House of SB RAS, 2024) 317 pp. ISBN 978-5-6050995-4-3.

The documentary study is devoted to the life and activity of the scientist and founder of the Novosibirsk School of Theoretical Physics, Yuri Borisovich Rumer (1901–1985). Yu.B. Rumer graduated from Moscow University and worked at the Institute of Theoretical Physics in Göttingen under the guidance of M. Born. He knew perfectly well the problems of mathematics, physics, chemistry, and genetics of that time and as a teacher at institutes in Moscow, Eniseisk, and Novosibirsk, shared his knowledge with his students. Arrested for political reasons, Rumer spent ten years as a ‘specialist’ of the Fourth Special Department of the NKVD in the aviation industry. In 1958–1964, he headed the Institute of Radiophysics and Electronics of the SB of the USSR Academy of Sciences, then began working at the Institute of Mathematics and the Institute of Nuclear physics of the SB of the Academy of Sciences. The book consists of three parts.

First, there is a historical biographical study proper (reconstruction). Next is the publication of archival documents and certificates, some of which are quoted, but are of considerable interest as full texts. They are documents from several central, regional, and departmental archives, memoirs, and reminiscences of contemporaries, including Yu.B. Rumer’s friends, colleagues, and students. The third part consists of appendices, which include an essay of one of the repressed Rumer brothers, Isidor Borisovich (1884–1938), a chronicle of the life of Yuri Borisovich, an index of names, and a list of abbreviations. The book is of interest for specialists in the history of physics, the history of science and technology, the social history of science, and biographies. It can be useful for history teachers, physics students, and historians. It is addressed to all those interested in the history of Russian science. (Publishing House of Siberian branch of the Russian Academy of Sciences: URL: <https://siran.ru/>).

For **Yu.B. Rumer’s** papers and information about him in the journal *Uspekhi Fizicheskikh Nauk* (in Russian), see <https://ufn.ru/ru/authors/1516/ru-rumer-yurii-b/> and in English translation in *Physics–Uspekhi*, see <https://ufn.ru/en/authors/1516/ru-rumer-yurii-b/>

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