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Neutron Physics for Nuclear Reactors
Fundamentals of Nuclear Engineering
A Laboratory Course in Reactor Physics Presented in the 1951-1952 Session
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Nuclear Reactor Analysis
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Current Outstanding Reactor Physics Problems
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The Elements of Nuclear Reactor Theory
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Reactor Physics Constants World Scientific INTRODUCTION TO NUCLEAR REACTOR PHYSICS is the most comprehensive, modern and readable textbook for this course/module. It explains reactors, fuel cycles, radioisotopes, radioactive materials, design, and operation. Chain reaction and fission reactor concepts are presented, plus advanced coverage including neutron diffusion theory. The diffusion equation, Fisk's Law, and steady state/time-dependent reactor behavior. Numerical and analytical solutions are also covered. The text has full color illustrations throughout, and a wide range of student learning features.

Variational Methods in Nuclear Reactor Physics Pergamon Originally just an offshoot of nuclear physics, neutron physics soon became a branch of physics in its own right. It deals with the movement of neutrons in nuclear reactors and all the nuclear reactions they trigger there, particularly the fission of heavy nuclei which starts a chain reaction to produce energy. Neutron Physics covers the whole range of knowledge of this complex science, discussing the basics of neutron physics and some principles of neutron physics calculations. Because neutron physics is the essential part of reactor physics, it is the main subject taught to students of Nuclear Engineering. This book takes an instructional approach for that purpose. Neutron Physics is also intended for all physicists and engineers involved in development or operational

aspects of nuclear power.
Technical Progress Report, Reactor Physics and Mathematics for the Period ... Franklin Book Company
An introductory text for broad areas of nuclear reactor physics Nuclear Reactor Physics and Engineering offers information on analysis, design, control, and operation of nuclear reactors. The author—a noted expert on the topic—explores the fundamentals and presents the mathematical formulations that are grounded in differential equations and linear algebra. The book puts the focus on the use of neutron diffusion theory for the development of techniques for lattice physics and global reactor system analysis. The author also includes recent developments in numerical algorithms, including the Krylov subspace method, and the MATLAB software, including the Simulink toolbox, for efficient studies of steady-state and transient reactor configurations. In addition, nuclear fuel cycle and associated economics analysis are presented, together with the application of modern control theory to reactor operation. This important book: Provides a comprehensive introduction to the fundamental concepts of nuclear reactor physics and engineering Contains information on nuclear reactor kinetics and reactor design analysis Presents illustrative examples to enhance understanding Offers self-contained derivation of fluid conservation equations Written for undergraduate and graduate students in nuclear engineering and practicing engineers, Nuclear Reactor Physics and Engineering covers the fundamental concepts and tools of nuclear reactor physics and analysis.
Fundamentals of Nuclear Reactor Physics Elsevier
Fundamental of Nuclear Engineering is derived from over 25 years of teaching undergraduate and graduate courses on nuclear engineering. The material has been extensively class tested and provides the most comprehensive textbook and reference on the fundamentals of nuclear engineering. It includes a broad range of important areas in the nuclear engineering field; nuclear and atomic theory; nuclear reactor physics, design, control/dynamics, safety and thermal-hydraulics; nuclear fuel engineering; and health physics/radiation protection. It also includes the latest information that is missing in traditional texts, such as space radiation. The aim of the book is to provide a source for upper level undergraduate and graduate students studying nuclear engineering.
Introductory Nuclear Reactor Dynamics McGraw-Hill Companies
Fundamentals of Nuclear Reactor Physics offers a one-semester treatment of the essentials of how the fission nuclear reactor works, the various approaches to the design of reactors, and their safe and efficient operation . It provides a clear, general overview of atomic physics from the standpoint of reactor functionality and design, including the sequence of fission reactions and their energy release. It provides in-depth discussion of neutron reactions, including neutron kinetics and the neutron energy spectrum, as well as neutron spatial distribution. It includes ample worked-out examples and over 100 end-of-chapter problems. Engineering students will find this applications-oriented approach, with many worked-out examples, more accessible and more meaningful as they aspire to become future nuclear engineers. A clear, general overview of atomic physics from the

standpoint of reactor functionality and design, including the sequence of fission reactions and their energy release In-depth discussion of neutron reactions, including neutron kinetics and the neutron energy spectrum, as well as neutron spatial distribution Ample worked-out examples and over 100 end-of-chapter problems Full Solutions Manual

Variational Methods in Nuclear Reactor Physics John Wiley & Sons
Classic textbook for an introductory course in nuclear reactor analysis that introduces the nuclear engineering student to the basic scientific principles of nuclear fission chain reactions and lays a foundation for the subsequent application of these principles to the nuclear design and analysis of reactor cores. This text introduces the student to the fundamental principles governing nuclear fission chain reactions in a manner that renders the transition to practical nuclear reactor design methods most natural. The authors stress throughout the very close interplay between the nuclear analysis of a reactor core and those nonnuclear aspects of core analysis, such as thermal-hydraulics or materials studies, which play a major role in determining a reactor design.

Nuclear Reactor Wiley-Interscience
Of all subjects the physics, engineering and technology of nuclear reactors is perhaps one of the most esoteric yet it plays a highly important role in most of our lives; and soon, without doubt, will become even more so. Because it is generally unknown means that it is often feared but it shouldn't be. Books that broach this subject often do so from either a most basic approach, leaving the enquiring mind wanting for more, or more often are designed specifically for students of nuclear engineering to a very advanced level and are therefore far too advanced for the level of interest of the non-nuclear student or first/second year nuclear undergraduate and often assume that the reader is already in possession of high level mathematics. This book sets out, at fast pace, to ease the reader into this subject at an elementary, further elementary and intermediate level but also addresses any theory from basic first principles that is often missing in other literature. Herein we explain this subject without missing out the necessary concomitant underlying concepts without which the student will remain forever wondering how. This book is also designed to suit, and is navigable at, all aspirational levels of study from basic technology to advanced physics. Within we shall discuss: nuclear & atomic physics and technology, nuclear fission, fusion, radiation, shielding and instrumentation, analysis of reactor core design geometries, critical mass calculations and fuel pitch optimization, fuel poisoning, reactor stability, reactor types and characteristics, nuclear accidents and safety, fuel manufacture, chemistry and enrichment, metallurgy of reactor materials, fuel loading and burn-up calculations. Further to this, substantial other material has been added given the need for wider engineering perspectives of power plant design, thermodynamics, thermal-hydraulics, engineering control theory and in introducing useful topics, including theory and techniques in linear analysis, for bridging into advanced reactor theory. This book is a highly illustrated, concise and comprehensive, practical and theoretical introduction to this high utility subject and also serves beyond its apparent cognitive application. It is designed to provide more than that of

a textbook at the elementary/further elementary/intermediate level. If you are a student of physics, mechanical, chemical, electrical or environmental engineering, mathematics or chemistry, are a naval officer or just academically or curiously minded who seeks a better understanding of this mysterious subject or if you are a first/second year nuclear engineering student then this book will get you straight in and help you succeed in understanding the fascinating world of nuclear energy.

Reactor Physics Constants Wiley-Interscience

Since the publication of the bestselling first edition, there have been numerous advances in the field of nuclear science. In medicine, accelerator based teletherapy and electron-beam therapy have become standard. New demands in national security have stimulated major advances in nuclear instrumentation.An ideal introduction to the fundamentals of nuclear science and engineering, this book presents the basic nuclear science needed to understand and quantify an extensive range of nuclear phenomena. New to the Second Edition— A chapter on radiation detection by Douglas McGregor Up-to-date coverage of radiation hazards, reactor designs, and medical applications Flexible organization of material that allows for quick reference This edition also takes an in-depth look at particle accelerators, nuclear fusion reactions and devices, and nuclear technology in medical diagnostics and treatment. In addition, the author discusses applications such as the direct conversion of nuclear energy into electricity. The breadth of coverage is unparalleled, ranging from the theory and design characteristics of nuclear reactors to the identification of biological risks associated with ionizing radiation. All topics are supplemented with extensive nuclear data compilations to perform a wealth of calculations. Providing extensive coverage of physics, nuclear science, and nuclear technology of all types, this up-to-date second edition of Fundamentals of Nuclear Science and Engineering is a key reference for any physicists or engineer.

Peaceful Uses of Atomic Energy Wiley

The third, revised edition of this popular textbook and reference, which has been translated into Russian and Chinese, expands the comprehensive and balanced coverage of nuclear reactor physics to include recent advances in understanding of this topic. The first part of the book covers basic reactor physics, including, but not limited to nuclear reaction data, neutron diffusion theory, reactor criticality and dynamics, neutron energy distribution, fuel burnup, reactor types and reactor safety. The second part then deals with such physically and mathematically more advanced topics as neutron transport theory, neutron slowing down, resonance absorption, neutron thermalization, perturbation and variational methods, homogenization, nodal and synthesis methods, and space-time neutron dynamics. For ease of reference, the detailed appendices contain nuclear data, useful mathematical formulas, an overview of special functions as well as introductions to matrix algebra and Laplace transforms. With its focus on conveying the in-depth knowledge needed by advanced student and professional nuclear engineers, this text is ideal for use in numerous courses and for self-study by professionals in basic nuclear reactor physics, advanced nuclear reactor physics, neutron transport theory, nuclear reactor dynamics and stability, nuclear reactor

fuel cycle physics and other important topics in the field of nuclear reactor physics.

Notes on Reactor Analysis Elsevier Nuclear Science and Technology, Volume 10: Variational Methods in Nuclear Reactor Physics presents the mathematical methods of a variational origin that are useful in obtaining approximate solutions to science and engineering problems. This book is composed of five chapters and begins with a discussion on the variation principles for physical systems described by both inhomogeneous and homogeneous equations to develop a generalized perturbation theory. Chapter 2 deals with the applications of variational estimates and generalized perturbation theory to neutron transport problems. Chapter 3 covers the variation principles of the Lagrangian form that are constructed for a general, linear- time-dependent process and for the specific case of the P1 neutron kinetics equations. Chapter 4 presents the general procedure for the variational derivation of synthesis approximations and their applications to problems in reactor physics. This chapter also examines the relationship of the spatial synthesis and finite-element method and a hybrid method that combines features of both methods. Chapter 5 describes the relationship of variation theory with the Hamilton-Jacobi theory and with the optimization theories of the maximum principle and dynamic programming. Nuclear physicists and researchers will find this text invaluable.

Naval Reactors Physics Handbook: Selected basic techniques, edited by A. Radkowsky CRC Press

This text presents the theory and methods of prediction that are the heart of nuclear reactor safety. Time-dependent reactor behavior is explained in both mathematical and physical terms. This book also explains the logic behind the working formulas and calculational methods for reactor transients and illustrates typical dynamic responses. The classical concept of point kinetics is developed in three steps, with discussion of various solutions to kinetics problems. Each chapter includes homework problems and review questions.

Solutions Manual to Accompany Introductory Nuclear Physics John Wiley & Sons

This unique volume gives an accurate and very detailed description of the functioning and operation of basic nuclear reactors, as emerging from yet unpublished papers by Nobel Laureate Enrico Fermi. In the first part, the entire course of lectures on Neutron Physics delivered by Fermi at Los Alamos is reported, according to the version made by Anthony P French. Here, the fundamental physical phenomena are described very clearly and comprehensively, giving the appropriate physics grounds for the functioning of nuclear piles. In the second part, all the patents issued by Fermi (and coworkers) on the functioning, construction and operation of several different kinds of nuclear reactors are reported. Here, the main engineering problems are encountered and solved by employing simple and practical methods, which are described in detail. This seminal work mainly caters to students, teachers and researchers working in nuclear physics and engineering, but it is of invaluable interest to historians of physics too, since the material presented here is entirely novel.

Neutron Physics for Nuclear Reactors CRC

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Fundamentals of Nuclear Engineering
Manchester University Press
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