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# Nuclear Criticality Safety Theory And Practice Knief

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The Physical Theory of Neutron Chain Reactors

Nuclear Reactor Theory

Plutonium, Deadly Gold of the Nuclear Age

The Los Alamos Primer

Methods of Steady-state Reactor Physics in Nuclear Design

Serial Reports on Start-up Experiments

Safety Margins of Operating Reactors

Nuclear Weapons Technology 101 for Policy Wonks

Atoms, Nuclei, and Interactions of Ionizing Radiation with Matter (First Edition)

The Technological and Economic Future of Nuclear Power

Passive Nondestructive Assay of Nuclear Materials

Nuclear Safety

Uranium Enrichment and Nuclear Weapon Proliferation

Nuclear Criticality Safety: Evaluations, Calculations, and Experiences

A Slow Death

Handbook on Nuclear Law

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## **DICKERSON LEILA**

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*The Physical Theory of Neutron Chain  
Reactors* CRC Press

More than seventy years ago, American forces exploded the first atomic bombs over the Japanese cities of Hiroshima and Nagasaki, causing great physical and human destruction. The young scientists at Los Alamos who developed the bombs, which were nicknamed Little Boy and Fat

Man, were introduced to the basic principles and goals of the project in March 1943, at a crash course in new weapons technology. The lecturer was physicist Robert Serber, J. Robert Oppenheimer's protégé, and the scientists learned that their job was to design and build the world's first atomic bombs. Notes on Serber's lectures were gathered into a mimeographed document titled The Los Alamos Primer, which was supplied to all incoming scientific staff. The Primer remained classified for decades after the war. Published for the first time in 1992,

the Primer offers contemporary readers a better understanding of the origins of nuclear weapons. Serber's preface vividly conveys the mingled excitement, uncertainty, and intensity felt by the Manhattan Project scientists. This edition includes an updated introduction by Pulitzer Prize-winning historian Richard Rhodes. A seminal publication on a turning point in human history, The Los Alamos Primer reveals just how much was known and how terrifyingly much was unknown midway through the Manhattan Project. No other seminar anywhere has had greater

historical consequences.

**Nuclear Reactor Theory** International Atomic Energy Agency

This open access book discusses the eroding economics of nuclear power for electricity generation as well as technical, legal, and political acceptance issues. The use of nuclear power for electricity generation is still a heavily disputed issue. Aside from technical risks, safety issues, and the unsolved problem of nuclear waste disposal, the economic performance is currently a major barrier. In recent years, the costs have skyrocketed especially in the European countries and North America. At the same time, the costs of alternatives such as photovoltaics and wind power have significantly decreased.

**Plutonium, Deadly Gold of the Nuclear Age** American Nuclear Society

As energy demand increases in line with the expansion of the world's leading economies and the growth of developing economies, a key challenge remains of how to provide the energy levels required while protecting our environment and conserving natural resources. Nuclear energy is a complex and controversial

technology but also has the potential to provide considerable benefits. This publication explores a range of issues involved in the use of nuclear energy, including safety aspects, whether its use is economically competitive, its role in meeting greenhouse gas reduction targets, how to manage the radioactive waste it generates, whether its use increase the risk of proliferation of nuclear weapons, security of resources, and its potential role in the future.

*The Los Alamos Primer* Princeton University Press

This book summarizes presentations and discussions from the two-day international workshop held at UC Berkeley in March 2015, and derives questions to be addressed in multi-disciplinary research toward a new paradigm of nuclear safety. The consequences of the Fukushima Daiichi nuclear accident in March 2011 have fuelled the debate on nuclear safety: while there were no casualties due to radiation, there was substantial damage to local communities. The lack of common understanding of the basics of environmental and radiological sciences has made it difficult for stakeholders to

develop effective strategies to accelerate recovery, and this is compounded by a lack of effective decision-making due to the eroded public trust in the government and operators. Recognizing that making a society resilient and achieving higher levels of safety relies on public participation in and feedback on decision-making, the book focuses on risk perception and mitigation in its discussion of the development of resilient communities. This work was published by Saint Philip Street Press pursuant to a Creative Commons license permitting commercial use. All rights not granted by the work's license are retained by the author or authors.

[Methods of Steady-state Reactor Physics in Nuclear Design](#) OECD

This document replaces the statement and proposals made in the discussion document Tolerability of Risk form Nuclear Power Stations published in 1988. It represents a revision of the earlier document in the light of comments received and of the discussion on the document during the Hinkley Point Inquiry and in the Inquiry report.

[Serial Reports on Start-up Experiments](#)

John Wiley & Sons  
 Safety and Reliability – Theory and Applications contains the contributions presented at the 27th European Safety and Reliability Conference (ESREL 2017, Portorož, Slovenia, June 18-22, 2017). The book covers a wide range of topics, including: • Accident and Incident modelling • Economic Analysis in Risk Management • Foundational Issues in Risk Assessment and Management • Human Factors and Human Reliability • Maintenance Modeling and Applications • Mathematical Methods in Reliability and Safety • Prognostics and System Health Management • Resilience Engineering • Risk Assessment • Risk Management • Simulation for Safety and Reliability Analysis • Structural Reliability • System Reliability, and • Uncertainty Analysis. Selected special sessions include contributions on: the Marie Skłodowska-Curie innovative training network in structural safety; risk approaches in insurance and finance sectors; dynamic reliability and probabilistic safety assessment; Bayesian and statistical methods, reliability data and testing; organizational factors and safety culture;

software reliability and safety; probabilistic methods applied to power systems; socio-technical-economic systems; advanced safety assessment methodologies: extended Probabilistic Safety Assessment; reliability; availability; maintainability and safety in railways: theory & practice; big data risk analysis and management, and model-based reliability and safety engineering. Safety and Reliability – Theory and Applications will be of interest to professionals and academics working in a wide range of industrial and governmental sectors including: Aeronautics and Aerospace, Automotive Engineering, Civil Engineering, Electrical and Electronic Engineering, Energy Production and Distribution, Environmental Engineering, Information Technology and Telecommunications, Critical Infrastructures, Insurance and Finance, Manufacturing, Marine Industry, Mechanical Engineering, Natural Hazards, Nuclear Engineering, Offshore Oil and Gas, Security and Protection, Transportation, and Policy Making.  
**Safety Margins of Operating Reactors**  
 CRC Press  
 Intended for graduate-level introductory

courses in nuclear physics and radiation interaction, Atoms, Nuclei, and Interactions of Ionizing Radiation with Matter gives students the foundation needed to study specialized subjects such as nuclear reactor physics, radiation transport methods, radiation detection, and radiation dosimetry. The text discusses the modern physics relevant to radiation interaction beginning with a condensed examination of nuclear physics and radioactive decay. There is an examination of nuclear reaction kinematics and how the different types of radiation engage in various types of nuclear or atomic interactions with matter. The interaction probability is discussed in term of "cross section." Both classical mechanics and wave mechanics are used to derive the cross section formulas. Specific examples are given when classical mechanics breaks down and quantum mechanics prevails. Extensively class-tested, the material in Atoms, Nuclei, and Interactions of Ionizing Radiation with Matter successfully links three closely-related subjects so that they can be taught in a succinct, one-semester course. The book is intended to serve as the

primary text for entry-level radiation physics courses for students majoring in nuclear engineering, health physics, or medical physics.

[Nuclear Weapons Technology 101 for Policy Wonks](#) Springer

The present report is a revision of Safety Series No. 75-INSAG-3 (1988), updating the statements made on the objectives and principles of safe design and operation for electricity generating nuclear power plants. It includes the improvements made in the safety of operating nuclear power plants and identifies the principles underlying the best current safety policies to be applied in future plants. It presents INSAG's understanding of the principles underlying the best current safety policies and practices of the nuclear power industry.

**Atoms, Nuclei, and Interactions of Ionizing Radiation with Matter (First Edition)** Cambridge University Press

"Nuclear weapons, since their conception, have been the subject of secrecy. In the months after the dropping of the atomic bombs on Hiroshima and Nagasaki, the American scientific establishment, the American government, and the American

public all wrestled with what was called the "problem of secrecy," wondering not only whether secrecy was appropriate and effective as a means of controlling this new technology but also whether it was compatible with the country's core values. Out of a messy context of propaganda, confusion, spy scares, and the grave counsel of competing groups of scientists, what historian Alex Wellerstein calls a "new regime of secrecy" was put into place. It was unlike any other previous or since. Nuclear secrets were given their own unique legal designation in American law ("restricted data"), one that operates differently than all other forms of national security classification and exists to this day. Drawing on massive amounts of declassified files, including records released by the government for the first time at the author's request, Restricted Data is a narrative account of nuclear secrecy and the tensions and uncertainty that built as the Cold War continued. In the US, both science and democracy are pitted against nuclear secrecy, and this makes its history uniquely compelling and timely"--

*The Technological and Economic Future of*

*Nuclear Power* John Wiley & Sons

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.

*Passive Nondestructive Assay of Nuclear Materials* Elsevier

Nuclear engineering has undergone extensive progress over the years. In the past century, colossal developments have been made and with specific reference to the mathematical theory and computational science underlying this discipline, advances in areas such as high-order discretization methods, Krylov Methods and Iteration Acceleration have steadily grown. Nuclear Computational Science: A Century in Review addresses these topics and many more; topics which hold special ties to the first half of the century, and topics focused around the unique combination of nuclear engineering, computational science and mathematical theory. Comprising eight chapters, Nuclear Computational Science:

A Century in Review incorporates a number of carefully selected issues representing a variety of problems, providing the reader with a wealth of information in both a clear and concise manner. The comprehensive nature of the coverage and the stature of the contributing authors combine to make this a unique landmark publication. Targeting the medium to advanced level academic, this book will appeal to researchers and students with an interest in the progression of mathematical theory and its application to nuclear computational science.

*Nuclear Safety* Cognella Academic Publishing

This book covers the entire spectrum of the science and technology of nuclear reactor systems, from underlying physics, to next generation system applications and beyond. Beginning with neutron physics background and modeling of transport and diffusion, this self-contained learning tool progresses step-by-step to discussions of reactor kinetics, dynamics, and stability that will be invaluable to anyone with a college-level mathematics background wishing to develop an

understanding of nuclear power. From fuels and reactions to full systems and plants, the author provides a clear picture of how nuclear energy works, how it can be optimized for safety and efficiency, and why it is important to the future.

*Uranium Enrichment and Nuclear Weapon Proliferation* University of Chicago Press

Nuclear Energy is one of the most popular texts ever published on basic nuclear physics, systems, and applications of nuclear energy. This newest edition continues the tradition of offering a holistic treatment of everything the undergraduate engineering student needs to know in a clear and accessible way. Presented is a comprehensive overview of radioactivity, radiation protection, nuclear reactors, waste disposal, and nuclear medicine. New coverage on nuclear safety concerns following 9/11, including radiation and terrorism, nuclear plant security, and use of nuclear techniques to detect weapons materials New facts on nuclear waste management, including the Yucca Mountain repository New developments in the use of nuclear-powered systems for generating cheap and abundant hydrogen from water using

nuclear technology New information on prospects for new nuclear power reactors and their applications for electricity and desalination New end-of-chapter Exercises and Answers, lists of Internet resources, and updated references

*Nuclear Criticality Safety: Evaluations, Calculations, and Experiences* Springer Physics of Nuclear Reactors presents a comprehensive analysis of nuclear reactor physics. Editors P. Mohanakrishnan, Om Pal Singh, and Kannan Umasankari and a team of expert contributors combine their knowledge to guide the reader through a toolkit of methods for solving transport equations, understanding the physics of reactor design principles, and developing reactor safety strategies. The inclusion of experimental and operational reactor physics makes this a unique reference for those working and researching nuclear power and the fuel cycle in existing power generation sites and experimental facilities. The book also includes radiation physics, shielding techniques and an analysis of shield design, neutron monitoring and core operations. Those involved in the development and operation of nuclear reactors and the fuel cycle will

gain a thorough understanding of all elements of nuclear reactor physics, thus enabling them to apply the analysis and solution methods provided to their own work and research. This book looks to future reactors in development and analyzes their status and challenges before providing possible worked-through solutions. Cover image: Kaiga Atomic Power Station Units 1 - 4, Karnataka, India. In 2018, Unit 1 of the Kaiga Station surpassed the world record of continuous operation, at 962 days. Image courtesy of DAE, India. Includes methods for solving neutron transport problems, nuclear cross-section data and solutions of transport theory Dedicates a chapter to reactor safety that covers mitigation, probabilistic safety assessment and uncertainty analysis Covers experimental and operational physics with details on noise analysis and failed fuel detection *A Slow Death* Routledge *Nuclear Criticality Safety: Evaluations, Calculations, and Experiences* features 29 chapters that describe fundamentals, applications, and experiences in nuclear criticality safety (NCS), with a focus on criticality accidents and lessons learned.

This volume caters to both students at the undergrad and graduate levels as well as established personnel just entering the criticality safety field. Additionally, those with experience in NCS can use the book as a valuable refresher and a means to update their understanding of current methods. Modern material on computer-enabled modeling and computation is included. Information in this text complements the seminal 1985 book *Nuclear Criticality Safety: Theory and Practice* by Dr. Ronald Knief.

*Handbook on Nuclear Law* Springer Science & Business Media

This comprehensive volume offers readers a progressive and highly detailed introduction to the complex behavior of neutrons in general, and in the context of nuclear power generation. A compendium and handbook for nuclear engineers, a source of teaching material for academic lecturers as well as a graduate text for advanced students and other non-experts wishing to enter this field, it is based on the author's teaching and research experience and his recognized expertise in nuclear safety. After recapping a number of points in nuclear physics, placing the

theoretical notions in their historical context, the book successively reveals the latest quantitative theories concerning:

- The slowing-down of neutrons in matter
- The charged particles and electromagnetic rays
- The calculation scheme, especially the simplification hypothesis
- The concept of criticality based on chain reactions
- The theory of homogeneous and heterogeneous reactors
- The problem of self-shielding
- The theory of the nuclear reflector, a subject largely ignored in literature
- The computational methods in transport and diffusion theories

Complemented by more than 400 bibliographical references, some of which are commented and annotated, and augmented by an appendix on the history of reactor physics at EDF (Electricité De France), this book is the most comprehensive and up-to-date introduction to and reference resource in neutronics and reactor theory.

Nuclear Materials Science John Wiley & Sons

Normal Accidents analyzes the social side of technological risk. Charles Perrow argues that the conventional engineering approach to ensuring safety--building in

more warnings and safeguards--fails because systems complexity makes failures inevitable. He asserts that typical precautions, by adding to complexity, may help create new categories of accidents. (At Chernobyl, tests of a new safety system helped produce the meltdown and subsequent fire.) By recognizing two dimensions of risk--complex versus linear interactions, and tight versus loose coupling--this book provides a powerful framework for analyzing risks and the organizations that insist we run them. The first edition fulfilled one reviewer's prediction that it "may mark the beginning of accident research." In the new afterword to this edition Perrow reviews the extensive work on the major accidents of the last fifteen years, including Bhopal, Chernobyl, and the Challenger disaster. The new postscript probes what the author considers to be the "quintessential 'Normal Accident'" of our time: the Y2K computer problem.

Nuclear Reactor Physics Springer

This expanded, revised, and updated fourth edition of Nuclear Energy maintains the tradition of providing clear and comprehensive coverage of all aspects of

the subject, with emphasis on the explanation of trends and developments. As in earlier editions, the book is divided into three parts that achieve a natural flow of ideas: Basic Concepts, including the fundamentals of energy, particle interactions, fission, and fusion; Nuclear Systems, including accelerators, isotope separators, detectors, and nuclear reactors; and Nuclear Energy and Man, covering the many applications of radionuclides, radiation, and reactors, along with a discussion of wastes and weapons. A minimum of mathematical background is required, but there is ample opportunity to learn characteristic numbers through the illustrative calculations and the exercises. An updated Solution Manual is available to the instructor. A new feature to aid the student is a set of some 50 Computer Exercises, using a diskette of personal computer programs in BASIC and spreadsheet, supplied by the author at a nominal cost. The book is of principal value as an introduction to nuclear science and technology for early college students, but can be of benefit to science teachers and lecturers, nuclear utility trainees and



engineers in other fields.

The Physics of Nuclear Reactors Elsevier  
This TECDOC deals with a basic concept of safety margins and their role in assuring safety of nuclear Installations. The document describes capabilities of thermal hydraulic computer codes used to determine safety margins, evaluation of uncertainties, methods for safety margin evaluation and utilization of safety margins in operation and modifications of nuclear power plants.

**Normal Accidents** McGill-Queen's Press - MQUP

Originally published in 1983, this book presents both the technical and political information necessary to evaluate the emerging threat to world security posed by recent advances in uranium enrichment technology. Uranium enrichment has

played a relatively quiet but important role in the history of efforts by a number of nations to acquire nuclear weapons and by a number of others to prevent the proliferation of nuclear weapons. For many years the uranium enrichment industry was dominated by a single method, gaseous diffusion, which was technically complex, extremely capital-intensive, and highly inefficient in its use of energy. As long as this remained true, only the richest and most technically advanced nations could afford to pursue the enrichment route to weapon acquisition. But during the 1970s this situation changed dramatically. Several new and far more accessible enrichment techniques were developed, stimulated largely by the anticipation of a rapidly growing demand for enrichment services by the world-wide

nuclear power industry. This proliferation of new techniques, coupled with the subsequent contraction of the commercial market for enriched uranium, has created a situation in which uranium enrichment technology might well become the most important contributor to further nuclear weapon proliferation. Some of the issues addressed in this book are: A technical analysis of the most important enrichment techniques in a form that is relevant to analysis of proliferation risks; A detailed projection of the world demand for uranium enrichment services; A summary and critique of present institutional non-proliferation arrangements in the world enrichment industry, and An identification of the states most likely to pursue the enrichment route to acquisition of nuclear weapons.

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