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POCKHY - KALEIGH HOLLAND

Fractional-Order Models for Nuclear Reactor Analysis presents fractional modeling issues in the context of anomalous diffusion processes in an accessible and practical way. The book emphasizes the importance of non-Fickian diffusion in heterogeneous systems as the core of the nuclear reactor, as well as different variations of diffusion processes in nuclear reactors which are presented to establish the importance of nuclear and thermohydraulic phenomena and the physical side effects of feedback. In addition, the book analyzes core issues in fractional modeling in nuclear reactors surrounding phenomenological description and important analytical sub-diffusive processes in the transport neutron. Users will find the most innovative modeling techniques of nuclear reactors using operator differentials of fractional order and applications in nuclear design and reactor dynamics. Proposed methods are tested with Boltzmann equations and non-linear order models alongside real data from nuclear power plants, making this a valuable resource for nuclear professionals, researchers and graduate students, as well as those working in nuclear research centers with expertise in mathematical modeling, physics and control. Presents and analyzes a new paradigm of nuclear reactor phenomena with fractional modeling Considers principles of fractional calculation, methods of solving differential equations of fractional order, and their applications Includes methodologies of linear and nonlinear analysis, along with design and dynamic analyses

This three-volume handbook contains a wealth of information on energy sources, energy generation and storage, fossil and renewable fuels as well as the associated processing technology. Fossil as well as renewable fuels, nuclear technology, power generation

and storage technologies are treated side by side, providing a unique overview of the entire global energy industry. The result is an in-depth survey of industrial-scale energy technology. Your personal ULLMANN'S: A carefully selected "best of" compilation of topical articles brings the vast knowledge of the Ullmann's encyclopedia to the desks of energy and process engineers Chemical and physical characteristics, production processes and production figures, main applications, toxicology and safety information are all found here in one single resource New or updated articles include classical topics such as coal technologies, oil and gas as well as cutting-edge technologies like biogas, thermoelectricity and solar technology 3 Volumes

This handbook surveys the range of methods and fuel types used in generating energy for industry, transportation, and heating and cooling of buildings. Solar, wind, biomass, nuclear, geothermal, ocean and fossil fuels are discussed and compared, and the thermodynamics of energy conversion is explained. Appendices are provided with fully updated data. Thoroughly revised, this second edition surveys the latest advances in energy conversion from a wide variety of currently available energy sources. It describes energy sources such as fossil fuels, biomass (including refuse-derived biomass fuels), nuclear, solar radiation, wind, geothermal, and ocean, then provides the terminology and units used for each energy resource and their equivalence. It includes an overview of the steam power cycles, gas turbines, internal combustion engines, hydraulic turbines, Stirling engines, advanced fossil fuel power systems, and combined-cycle power plants. It outlines the development, current use, and future of nuclear power. Buildings account for almost half of total primary energy use and related greenhouse emissions worldwide. Although current energy systems are improving, they still fall disappointingly short of meet-

ing acceptable limits for efficiency. Well-trained energy auditors are essential to the success of building energy efficiency programs-and Energy Audit

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.

With the encroachment of the Internet into nearly all aspects of work and life, it seems as though information is everywhere. However, there is information and then there is correct, appropriate, and timely information. While we might love being able to turn to

Wikipedia® for encyclopedia-like information or search Google® for the thousands of links on a topic, engineers need the best information, information that is evaluated, up-to-date, and complete. Accurate, vetted information is necessary when building new skyscrapers or developing new prosthetics for returning military veterans. While the award-winning first edition of *Using the Engineering Literature* used a roadmap analogy, we now need a three-dimensional analysis reflecting the complex and dynamic nature of research in the information age. *Using the Engineering Literature, Second Edition* provides a guide to the wide range of resources available in all fields of engineering. This second edition has been thoroughly revised and features new sections on nanotechnology as well as green engineering. The information age has greatly impacted the way engineers find information. Engineers have an effect, directly and indirectly, on almost all aspects of our lives, and it is vital that they find the right information at the right time to create better products and processes. Comprehensive and up to date, with expert chapter authors, this book fills a gap in the literature, providing critical information in a user-friendly format.

Air Distribution in Buildings is a concise and practical guide to air distribution system design and managing air conditioning systems in buildings. Making use of 40 years of experience in the design of air conditioning and ventilations systems, and other electromechanical services, this structured reference for built environment engineering offers in-depth coverage of air distribution technology. The text brings together a wide range of information and offers technical guidance on the design, calculation, and efficient operation of air distribution in buildings. The text highlights the special characteristics of air distribution in individual spaces. It presents the basic and fundamental concepts of air distribution as it relates to grilles and outlets, room space, and buildings. It focuses on air distribution systems in large buildings, starting with simple rooms and then moving on to more complex configurations. It also sums up the latest standards and best practices in air conditioning engineering. Includes knowledge of the new trends in buildings' air distribution. Provides systematic analyses of the air flow regimes, heat transfer, and relative humidity in a collection of special built environments. Presents energy analyses of the air conditioning systems for operating theaters and sporting facilities in unusual and severe climatic conditions. Offers a description of

flow characteristics in archeological monuments with emphasis on combating excessive moisture. Introduces examples of very dense occupancy built environments, moisture sensitive environments, and open space air conditioning. Details advanced treatment of flow characterization in large public buildings. This text serves as an ideal resource for air conditioning engineers, contractors, and consultants. It also benefits mechanical and architectural engineering students.

For many transportation systems, the cost of expanding the infrastructure is too high. Therefore, the focus must shift to improving the quality of transportation within the existing infrastructure. The second edition of a bestseller, *Intelligent Transport Systems: Smart and Green Infrastructure Design* critically examines the successes and failures

Better Understand the Relationship between Powertrain System Design and Its Control Integration. While powertrain system design and its control integration are traditionally divided into two different functional groups, a growing trend introduces the integration of more electronics (sensors, actuators, and controls) into the powertrain system.

Energy Efficiency in the Urban Environment is a study of energy crisis, urbanisation, and climate change, as well as a discussion of how to combat these global challenges. With a special focus on Egypt, this book addresses the macroscale of urbanism from the perspective of city dwellers' quality of life, and explores the microscale of buildings and the perspective of ensuring indoor air quality within the boundaries of energy efficiency. Offering an integrated view of energy systems and urban planning supported by extensive data, references, and case studies, this text: Examines the energy efficiency performance of cities following sustainable urbanism principles. Investigates how informal areas in developing countries achieve sustainable development. Presents energy-efficient urban planning as a tool for improving city energy performance. Proposes the development of a common procedure for obtaining an energy performance certificate. Calculates the energy performance of buildings, accounting for heating/cooling systems and other variables. *Energy Efficiency in the Urban Environment* demonstrates the importance of implementing an energy performance directive to aid energy savings in large buildings and set regulations for energy-efficient designs based on standard calculation methods. This book provides engineers working with sustain-

able energy systems, urban planners needing information on energy systems and optimisation, and professors and students of engineering, environmental science, and urban planning with a valuable reference on energy sustainability.

Building upon the success of the first edition, the *Nuclear Engineering Handbook, Second Edition*, provides a comprehensive, up-to-date overview of nuclear power engineering. Consisting of chapters written by leading experts, this volume spans a wide range of topics in the areas of nuclear power reactor design and operation, nuclear fuel cycles, and radiation detection. Plant safety issues are addressed, and the economics of nuclear power generation in the 21st century are presented. The Second Edition also includes full coverage of Generation IV reactor designs, and new information on MRS technologies, small modular reactors, and fast reactors.

What role will biofuels play in the scientific portfolio that might bring energy independence and security, revitalize rural infrastructures, and wean us off of our addiction to oil? The shifting energy landscape of the 21st century, with its increased demand for renewable energy technology, poses a worrying challenge. Discussing the multidisciplinary

Uranium for Nuclear Power: Resources, Mining and Transformation to Fuel discusses the nuclear industry and its dependence on a steady supply of competitively priced uranium as a key factor in its long-term sustainability. A better understanding of uranium ore geology and advances in exploration and mining methods will facilitate the discovery and exploitation of new uranium deposits. The practice of efficient, safe, environmentally-benign exploration, mining and milling technologies, and effective site decommissioning and remediation are also fundamental to the public image of nuclear power. This book provides a comprehensive review of developments in these areas. Provides researchers in academia and industry with an authoritative overview of the front end of the nuclear fuel cycle. Presents a comprehensive and systematic coverage of geology, mining, and conversion to fuel, alternative fuel sources, and the environmental and social aspects. Written by leading experts in the field of nuclear power, uranium mining, milling, and geological exploration who highlight the best practices needed to ensure environmental safety.

Handbook of Generation IV Nuclear Reactors, Second Edition is a fully revised and updated comprehensive resource on the latest

research and advances in generation IV nuclear reactor concepts. Editor Igor Pioro and his team of expert contributors have updated every chapter to reflect advances in the field since the first edition published in 2016. The book teaches the reader about available technologies, future prospects and the feasibility of each concept presented, equipping them users with a strong skillset which they can apply to their own work and research. Provides a fully updated, revised and comprehensive handbook dedicated entirely to generation IV nuclear reactors Includes new trends and developments since the first publication, as well as brand new case studies and appendices Covers the latest research, developments and design information surrounding generation IV nuclear reactors

The A-to-Z reference resource for nuclear energy information A significant milestone in the history of nuclear technology, Nuclear Energy Encyclopedia: Science, Technology, and Applications is a comprehensive and authoritative reference guide written by a committee of the world's leading energy experts. The encyclopedia is packed with cutting-edge information about where nuclear energy science and technology came from, where they are today, and what the future may hold for this vital technology. Filled with figures, graphs, diagrams, formulas, and photographs, which accompany the short, easily digestible entries, the book is an accessible reference work for anyone with an interest in nuclear energy, and includes coverage of safety and environmental issues that are particularly topical in light of the Fukushima Daiichi incident. A definitive work on all aspects of the world's energy supply, the Nuclear Energy Encyclopedia brings together decades of knowledge about energy sources and technologies ranging from coal and oil, to biofuels and wind, and ultimately nuclear power.

Energy-Efficient Electrical Systems for Buildings offers a systematic and practical analysis and design approaches for electrical distribution and utilization systems in buildings. In addition to meeting the minimal safety requirements set by the National Electrical Code (NEC), the design approach consider the life-cycle cost analysis of designing energy efficient electrical distribution systems as well as integrating renewable energy technologies into both residential and commercial buildings. The book first provides a general overview of basic power systems commonly available in buildings. Then, detailed discussions of various components of typical building electrical distribution system are outlined through sever-

al chapters including transformers, protection devices, conductors and conduits, power and lighting panels, and motor control centers. The book includes several illustrations and numerous examples and analysis exercises are included, along with detailed design examples.

Developed with stress analysts handling multidisciplinary subjects in mind, and written to provide the theories needed for problem solving and stress analysis on structural systems, Essentials of Mechanical Stress Analysis presents a variety of relevant topics-normally offered as individual course topics-that are crucial for carrying out the analysis

Energy and the Environment explains in simple terms what the energy demand is at the present, what the environmental effects of energy use are, and what can be accomplished to alleviate the environmental effects of energy use and ensure adequate energy supply. Though technical in approach, the text uses simple explanations of engineering processes and systems and algebra-based math to be comprehensible to students in a range of disciplines. Schematic diagrams, quantitative examples, and numerous problems will help students make quantitative calculations. This will assist them in comprehending the complexity of the energy-environment balance, and to analyze and evaluate proposed solutions.

Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition is structured to provide a rigorous and comprehensive technical foundation and coverage to all the various elements inherent in the design of energy efficient and green buildings. Along with numerous new and revised examples, design case studies, and homework problems, the third edition includes the HCB software along with its extensive website material, which contains a wealth of data to support design analysis and planning. Based around current codes and standards, the Third Edition explores the latest technologies that are central to design and operation of today's buildings. It serves as an up-to-date technical resource for future designers, practitioners, and researchers wishing to acquire a firm scientific foundation for improving the design and performance of buildings and the comfort of their occupants. For engineering and architecture students in undergraduate/graduate classes, this comprehensive textbook:

Providing a proven set of energy efficiency measures and opportunities for saving energy and reducing operating costs for existing

homes, this volume presents general tools and procedures for performing home weatherization such as insulation improvements as well as methods to reduce air leakage. The author describes several techniques and technologies that can reduce energy use or operating costs, including methods to retrofit existing homes to be net-zero energy buildings. Each chapter contains simplified calculation methods used to evaluate the effectiveness of various efficiency measures. The final chapter offers a series of case studies including examples of weatherized homes.

Fuel Cells: Principles, Design, and Analysis considers the latest advances in fuel cell system development and deployment, and was written with engineering and science students in mind. This book provides readers with the fundamentals of fuel cell operation and design, and incorporates techniques and methods designed to analyze different fuel cell

Micro- and Nanostructured Composite Materials for Neutron Shielding Applications presents recent developments and future possibilities for neutron shielding materials. Emphasis is placed on the correlation between the morphology, shielding mechanisms, and other desired properties, including their mechanical and thermal properties. The effect of neutron absorbing fillers, including their size on final properties is also examined, as are recent advancements in preparation, characterization and simulation techniques. Written by specialists in their respective fields, this comprehensive resource will help professionals and students understand the fundamentals of neutron shielding, as well as the properties of micro- and nanopolymer-based composites, concrete materials, alloy materials and metal-ceramic composites. Provides an up-to-date understanding of the fundamentals of shielding mechanisms, morphology and material property correlations Covers a broad range of micro and nano composite materials for neutron shielding Discusses recent advances surrounding the synthesis and processing of nanostructures and nanocomposite materials

PRINCIPLES OF SUSTAINABLE ENERGY SYSTEMS, Third Edition, surveys the range of sustainable energy sources and the tools that engineers, scientists, managers, and policy makers use to analyze energy generation, usage, and future trends. The text provides complete and up-to-date coverage of all renewable technologies, including solar and wind power, biofuels, hydroelectric, nuclear, ocean power, and geothermal energy. The economics of energy are introduced, with the SAM software package integrated so stu-

dents can explore the dynamics of energy usage and prediction. Climate and environmental factors in energy use are integrated to give a complete picture of sustainable energy analysis and planning.

Exploring how to counteract the world's energy insecurity and environmental pollution, this volume covers the production methods, properties, storage, engine tests, system modification, transportation and distribution, economics, safety aspects, applications, and material compatibility of alternative fuels. The esteemed editor highlights the importance of moving toward alternative fuels and the problems and environmental impact of depending on petroleum products. Each self-contained chapter focuses on a particular fuel source, including vegetable oils, biodiesel, methanol, ethanol, dimethyl ether, liquefied petroleum gas, natural gas, hydrogen, electric, fuel cells, and fuel from nonfood crops.

The book considers the implications of the nuclear energy revival for global governance in the areas of safety, security and non-proliferation. Increased global warming, the energy demands of China, India and other emerging economic powerhouses and the problems facing traditional and alternative energy sources have lead many to suggest that there will soon be a nuclear energy 'renaissance'. This book examines comprehensively the drivers of and constraints on the revival, its nature and scope and the possibility that nuclear power will spread significantly beyond the countries which currently rely on it. Of special interest are developing countries which aspire to have nuclear energy and which currently lack the infrastructure, experience and regulatory structures to successfully manage such a major industrial enterprise. Of even greater interest are countries that may see in a nuclear energy program a 'hedging' strategy for a future nuclear weapons option. Following on from this assessment, the author examines the likely impact of various revival scenarios on the current global governance of nuclear energy, notably the treaties, international organizations, arrangements and practices designed to ensure that nuclear power is safe, secure and does not contribute to the proliferation of nuclear weapons. The book concludes with recommendations to the international community on how to strengthen global governance in order to manage the nuclear energy revival prudently. This book will be of much interest to students of energy security, global governance, security studies and IR in general.

This book examines the three most well-known and socially impor-

tant nuclear accidents. Each of these accidents had significant, yet dramatically different, human and environmental impacts. Unique factors helped shape the overall pattern and scale of each disaster, but a major contributing factor was the different designs used for each reactor. Fukushima was a boiling water reactor (BWR), Chernobyl was a graphite moderated boiling water reactor, and TMI was a pressurized water reactor (PWR). This book traces the history of nuclear power and the development of each reactor type. We examine how GE's work with a sodium cooled design did not fare well with the US Navy, and led GE to promulgate the BWR design. We explore the Russian atomic bomb program, its use of graphite moderated reactors, and their design modifications to create power production units. We trace the developments in the US that led the US Navy to select the PWR design, and caused the PWR to be used for nearly 2/3 of all US commercial reactors. In sum, the book uses the three major nuclear accidents as a lens to trace the technological history of nuclear energy production and to link these developments with long-term societal and environmental consequences. The book is intended for readers with an interest in nuclear power and nuclear disasters. The detailed and compelling account will appeal to both the expert and the interested lay-person.

A transition from a fossil fuel-based economy to one that uses renewable energy has become inevitable; this transition will not only be an engineering challenge, but will also be an economic and environmental one. Offering an interdisciplinary, quantitative approach, *Principles of Sustainable Energy* presents a comprehensive overview of the major renewable energy technologies currently available, including biomass and biofuels, solar thermal conversion, photovoltaics, and wind energy conversion. Written by renowned expert Frank Kreith, the book emphasizes economics as well as energy return on investment analyses for each technology and integrates the need for energy conservation with the overall aspects of building a sustainable energy system with renewable sources. The author covers energy storage in depth, because it is considered one of the most important, and problematic, requirements for building a sustainable renewable energy system. Treatments of the economics of nuclear power and options for transportation systems are also included. The book contains worked-out example problems illustrating engineering analyses from a systems perspective and problem sets to reinforce concepts and ap-

plications. Examples and exercises relating to solar energy systems cover latitudes in the Northern and Southern Hemispheres and use current worldwide solar radiation data. But this text is not merely academic: its clearheaded look at the energy picture from the ground up, and the environmental, economic, and sustainability benefits that renewable energy systems can provide, make it a resource for government and industry as well as a text for engineering students.

An Accessible, Scientifically Rigorous Presentation That Helps Your Students Learn the Real Stuff Winner of a CHOICE Outstanding Academic Book Award 2011 "... takes the revolutionary concepts and techniques that have traditionally been fodder for graduate study and makes them accessible for all. ... outstanding introduction to the broad field of nanotechnology provides a solid foundation for further study. ... Highly recommended." —N.M. Fahrenkopf, University at Albany, CHOICE Magazine 2011 Give your students the thorough grounding they need in nanotechnology. A rigorous yet accessible treatment of one of the world's fastest growing fields, *Nanotechnology: Understanding Small Systems*, Third Edition provides an accessible introduction without sacrificing rigorous scientific details. This approach makes the subject matter accessible to students from a variety of disciplines. Building on the foundation set by the first two bestselling editions, this third edition maintains the features that made previous editions popular with students and professors alike. See What's New in the Third Edition: Updated coverage of the eight main facets of nanotechnology Expanded treatment of health/environmental ramifications of nanomaterials Comparison of macroscale systems to those at the nanoscale, showing how scale phenomena affects behavior New chapter on nanomedicine New problems, examples, and an exhaustive nanotech glossary Filled with real-world examples and original illustrations, the presentation makes the material fun and engaging. The systems-based approach gives students the tools to create systems with unique functions and characteristics. Fitting neatly between popular science books and high-level treatises, the book works from the ground up to provide a gateway into an exciting and rapidly evolving area of science.

This book presents a collection of selected reviews from PLMMP 2018 that address modern problems in the fields of liquids, solutions and confined systems, critical phenomena, as well as colloidal and biological systems. The papers focus on state-of-the-art

developments in the contemporary physics of liquid matter, and are divided into four parts: (i) water and water systems, (ii) physical-chemical properties of liquid systems, (iii) aggregation in liquid systems, and (iv) biological aspects of liquid systems, irradiation influences on liquid systems. Taken together, they cover the latest developments in the broader field of liquid states, including interdisciplinary problems.

Aspiring engineers need a text that prepares them to use thermodynamics in professional practice. Thermodynamics instructors need a concise textbook written for a one-semester undergraduate course—a text that foregoes clutter and unnecessary details but furnishes the essential facts and methods. Thermodynamics for Engineers, Second Edition continues to fill both those needs. Paying special attention to the learning process, the author has developed a unique, practical guide to classical thermodynamics. His approach is remarkably cohesive. For example, he develops the same example through his presentation of the first law and both forms of the second law—entropy and exergy. He also unifies his treatments of the conservation of energy, the creation of entropy, and the destruction of availability by using a balance equation for each, thus emphasizing the commonality between the laws and allowing easier comprehension and use. This Second Edition includes a new chapter on thermodynamic property relations and gives updated, expanded problem sets in every chapter. Accessible, practical, and cohesive, the text builds a solid foundation for advanced engineering studies and practice. It exposes students to the "big picture" of thermodynamics, and its streamlined presentation allows glimpses into important concepts and methods rarely offered by texts at this level. What's New in This Edition: Updated and expanded problem sets New chapter on thermodynamic property relations Updated chapter on heat transfer Electronic figures available upon qualifying course adoption End-of-chapter poems to summarize engineering principles

Linear and Non-Linear Stability Analysis in Boiling Water Reactors: The Design of Real-Time Stability Monitors presents a thorough analysis of the most innovative BWR reactors and stability phenomena in one accessible resource. The book presents a summary of existing literature on BWRs to give early career engineers and researchers a solid background in the field, as well as the latest research on stability phenomena (propagation phenomena in BWRs), nuclear power monitors, and advanced computer systems

used to for the prediction of stability. It also emphasizes the importance of BWR technology and embedded neutron monitoring systems (APRMs and LPRMs), and introduces non-linear stability parameters that can be used for the onset detection of instabilities in BWRs. Additionally, the book details the scope, advantages, and disadvantages of multiple advanced linear and non linear signal processing methods, and includes analytical case studies of existing plants. This combination makes Linear and Non-Linear Stability Analysis in Boiling Water Reactors a valuable resource for nuclear engineering students focusing on linear and non-linear analysis, as well as for those working and researching in a nuclear power capacity looking to implement stability methods and estimate decay ratios using non-linear techniques. Explores the nuclear stability of Boiling Water Reactors based on linear and non-linear models Evaluates linear signal processing methods such as autoregressive models, Fourier-based methods, and wavelets to calculate decay ratios Proposes novel non-linear signal analysis techniques linked to non-linear stability indicators Includes case studies of various existing nuclear power plants as well as mathematical models and simulations

Applications of Nuclear and Radioisotope Technology: For Peace and Sustainable Development presents the latest technology and research on nuclear energy with a practical focus on a variety of applications. Author Dr. Khalid Al-Nabhani provides a thorough and well-rounded view of the status of nuclear power generation in order to promote its benefits towards a sustainable, clean and secure future. This book offers innovative theoretical, analytical, methodological and technological approaches, encourages a positive societal and political uptake. This book enhances awareness of peaceful nuclear applications across a broad spectrum of industries, including power generation, agriculture, and medicine. It presents successful examples and lessons learned across many countries that are working towards their sustainability goals in cooperation with the IAEA and AAEA, to benefit researchers, professionals and decision-makers implementing and developing their own nuclear strategies for the future. Presents theoretical and scientific knowledge which is supported with real examples and successful experiences Provides prevailing perceptions of nuclear safety and security concerns by presenting the most advanced safety and security systems Applies technologies to a variety of applications to guide the reader to make informed decisions to help meet sustain-

ability goals

NUCLEAR ENGINEERING FUNDAMENTALS is the most modern, up-to-date, and reader friendly nuclear engineering textbook on the market today. It provides a thoroughly modern alternative to classical nuclear engineering textbooks that have not been updated over the last 20 years. Printed in full color, it conveys a sense of awe and wonder to anyone interested in the field of nuclear energy. It discusses nuclear reactor design, nuclear fuel cycles, reactor thermal-hydraulics, reactor operation, reactor safety, radiation detection and protection, and the interaction of radiation with matter. It presents an in-depth introduction to the science of nuclear power, nuclear energy production, the nuclear chain reaction, nuclear cross sections, radioactivity, and radiation transport. All major types of reactors are introduced and discussed, and the role of internet tools in their analysis and design is explored. Reactor safety and reactor containment systems are explored as well. To convey the evolution of nuclear science and engineering, historical figures and their contributions to evolution of the nuclear power industry are explored. Numerous examples are provided throughout the text, and are brought to life through life-like portraits, photographs, and colorful illustrations. The text follows a well-structured pedagogical approach, and provides a wide range of student learning features not available in other textbooks including useful equations, numerous worked examples, and lists of key web resources. As a bonus, a complete Solutions Manual and .PDF slides of all figures are available to qualified instructors who adopt the text. More than any other fundamentals book in a generation, it is student-friendly, and truly impressive in its design and its scope. It can be used for a one semester, a two semester, or a three semester course in the fundamentals of nuclear power. It can also serve as a great reference book for practicing nuclear scientists and engineers. To date, it has achieved the highest overall satisfaction of any mainstream nuclear engineering textbook available on the market today.

Nuclear chemistry represents a vital field of basic and applied research. Modern applications cover, for example, fundamental aspects of energetics and high-sensitive, high-selective and non-destructive analytical technologies. Nuclear chemistry and radiopharmaceutical chemistry are increasingly used to bridge pharmaceutical and medical research with state-of-the-art non-invasive molecular diagnosis as well as with patient-individual treatment. While

volume I on Introduction to Nuclear Chemistry describes the origin of unstable atoms and their pathways to stabilize, this volume II illustrates the spectrum of modern applications of nuclear and radiochemistry. In various chapters, leading scientists address -the measurement of radiation, -the dosimetric action of radioactive radiation and radiation safety -nuclear dating -elemental analysis by neutron activation, -radiation mass spectroscopy and chemicals speciation, -radiochemical separations, -applications of radiochemistry to life sciences, -the chemistry of radioelements: Tc and At, actinides and the transactinides -fundamentals of modern nuclear energy.

Pressurized Heavy Water Reactors: CANDU, the seventh volume in the JSME Series on Thermal and Nuclear Power Generation series, provides a comprehensive and complete review of a single type of reactor in a very accessible and practical way. The book presents the full lifecycle, from design and manufacturing to operation and maintenance, also covering fitness-for-service and long-term operation. It does not relate to any specific vendor-based technology, but rather provides a broad overview of the latest technologies from a variety of active locations which will be of great value to countries invested in developing their own nuclear programs. Including contemporary capabilities and challenges of nuclear technology, the book offers practical solutions to common problems faced, along with the safe and approved processes to reach suitable solutions. Professionals involved in nuclear power plant lifecycle assessment and researchers interested in the development and improvement of nuclear energy technologies will gain a deep understanding of PHWR nuclear reactor physics, chemistry and thermal-hydraulic properties. Provides a complete reference dedicated to the latest research on Pressurized Heavy Water Reactors and their economic and environmental benefits Goes beyond CANDU reactors to analyze the popular German and Indian designs, as well as plant design in Korea, Romania, China and Argentina Spans all phases of the nuclear power plant lifecycle, from design, manufacturing, operation, maintenance and long-term operation

Completely revised and updated, Principles of Sustainable Energy Systems, Second Edition presents broad-based coverage of sustainable energy sources and systems. The book is designed as a

text for undergraduate seniors and first-year graduate students. It focuses on renewable energy technologies, but also treats current trends such as the expanding use of natural gas from fracking and development of nuclear power. It covers the economics of sustainable energy, both from a traditional monetary as well as from an energy return on energy invested (EROI) perspective. The book provides complete and up-to-date coverage of all renewable technologies, including solar and wind power, biological processes such as anaerobic digestion and geothermal energy. The new edition also examines social issues such as food, water, population, global warming, and public policies of engineering concern. It discusses energy transition—the process by which renewable energy forms can effectively be introduced into existing energy systems to replace fossil fuels. See What's New in the Second Edition: Extended treatment of the energy and social issues related to sustainable energy Analytic models of all energy systems in the current and future economy Thoroughly updated chapters on biomass, wind, transportation, and all types of solar power Treatment of energy return on energy invested (EROI) as a tool for understanding the sustainability of different types of resource conversion and efficiency projects Introduction of the System Advisor Model (SAM) software program, available from National Renewable Energy Lab (NREL), with examples and homework problems Coverage of current issues in transition engineering providing analytic tools that can reduce the risk of unsustainable fossil resource use Updates to all chapters on renewable energy technology engineering, in particular the chapters dealing with transportation, passive design, energy storage, ocean energy, and bioconversion Written by Frank Kreith and Susan Krumdieck, this updated version of a successful textbook takes a balanced approach that looks not only at sustainable energy sources, but also provides examples of energy storage, industrial process heat, and modern transportation. The authors take an analytical systems approach to energy engineering, rather than the more general and descriptive approach usually found in textbooks on this topic.

Nuclear power has, in recent years, undergone a major transformation, resulting in major technical developments and a new generation of nuclear scientists and engineers. A comprehensive book that reflects the latest nuclear technologies has been lack-

ing—until now. The Nuclear Engineering Handbook is a response to this global resurgence of interest in commercial nuclear power. A broad overview of nuclear power and engineering and their limitless potential, this basic introduction to the field provides an in-depth discussion of power plants and extensive coverage of the nuclear fuel cycle, waste disposal, and related engineering technologies. Organized into three sections—Nuclear Power Reactors, Nuclear Fuel Cycle Processes and Facilities, and Engineering and Analytical Applications—this book addresses the entire nuclear fuel cycle and process. Topics include everything from the mining, milling, and enrichment of uranium and thorium fuel resources, to fuel fabrication, nuclear materials transportation, fuel reprocessing, and safe waste disposal. This all-encompassing volume discusses current analytical techniques related to nuclear engineering, addressing safety, heat transfer, shielding, thermo-hydraulics, and heat physics. Covering reactor operation and radiation protection, it also outlines the economic considerations involved in building new nuclear power stations instead of large fossil-fueled plants, and elaborates on concerns regarding the control of emissions from the latter. A review of past and current nuclear engineering capabilities, this valuable resource covers the gamut of crucial topics, including historical perspectives, a detailed technological review, and an assessment of the field's future direction. It is an exceptional tool that will help readers to foster optimal understanding and use of nuclear power for electricity generation now and in the future.

Engineering Separations Unit Operations for Nuclear Processing provides insight into the fundamentals of separations in nuclear materials processing not covered in typical texts. This book integrates fuel cycle and waste processing into a single, coherent approach, demonstrating that the principles from one field can and should be applied to the other. It provides historical perspectives on nuclear materials processing, current assessment and challenges, and how past challenges were overcome. It also provides understanding of the engineering principles associated with handling nuclear materials. This book is aimed at researchers, graduate students, and professionals in the fields of chemical engineering, mechanical engineering, nuclear engineering, and materials engineering.