Candu Reactor Severe Accident Analysis For Accident Management

This book provides in-depth knowledge to solve engineering, geometrical, mathematical, and scientific problems with the help of advanced computational methods with a focus on mechanical and materials engineering. Divided into three subsections covering design and fluids, thermal engineering and materials engineering, each chapter includes exhaustive literature review along with thorough analysis and future research scope. Major topics covered pertains to computational fluid dynamics, mechanical performance, design, and fabrication including wide range of applications in industries as automotive, aviation, electronics, nuclear and so forth. Covers computational methods in design and fluid dynamics with a focus on computational fluid dynamics Explains advanced material applications and manufacturing in labs using novel alloys and introduces properties in material Discusses fabrication of graphene reinforced magnesium metal matrix for orthopedic applications Illustrates simulation and optimization gear transmission, heat sink and heat exchangers application Provides unique problem-solution approach including solutions, methodology, experimental setup, and results validation This book is aimed at researchers, graduate students in mechanical engineering, computer fluid dynamics,fluid mechanics, computer modeling, machine parts, and mechatronics.

This report gives the results of a study of the thermo-hydraulicaspects of severe accident sequences in CANDU reactors. Theaccident sequences considered are the loss of the moderatorcooling system and the loss of the moderator heat sink, eachfollowing a large loss-of-coolant accident accompanied by loss ofemergency coolant injection. Factors considered includeexpulsion and boil-off of the moderator, uncovery, overheatingand disintegration of the fuel channels, quenching of channeldebris, re-heating of channel debris following complete moderatorexpulsion, formation and possible boiling of a molten pool ofcore debris and the effectiveness of the cooling of the calancriawall by the shield tank water during the accident sequences. Theeffects of these accident sequences on the reactor containmentare also considered.

This vital reference is the only one-stop resource on how to assess, prevent, and manage severe nuclear accidents in the light water reactors (LWRs) that pose the most risk to the public. LWRs are the predominant nuclear reactor in use around the world today, and they will continue to be the most frequently utilized in the near future. Therefore, accurate determination of the safety issues associated with such reactors is central to a consideration of the risks and benefits of nuclear power. This book emphasizes the prevention and management of severe accidents to teach nuclear professionals how to mitigate potential risks to the public to the maximum extent possible. Organizes and presents all the latest thought on LWR nuclear safety in one consolidated volume, provided by the top experts in the field, ensuring high-quality, credible and easily accessible information Explains how developments in the field of LWR severe accidents have provided more accurate determinations of risk, thereby shedding new light on the debates surrounding nuclear power safety, particularly in light of the recent tragedy in Japan Concentrates on prevention and management of accidents, developing methodologies to estimate the consequences and associated risks

Includes all works deriving from DOE, other related government-sponsored information and foreign nonnuclear information.

The Atomic Energy Control Board is the agency of the Government of Canadawhich controls the development, application, and use of atomic energy, andparticipates on behalf of Canada in international measures of control. Immediately after the serious accident at the Chernobyl nuclear rectorcomplex in

the Ukranian Soviet Socialist Republic, the AECB attempted toobtain as much information as was available and to review the implications ofthe accident. A post-accident review meeting of nuclear power and radiationprotection specialists was convened by the International Atomic Energy Agencyin Vienna in August 1986. On the basis of the information presented at thatmeeting, the AECB carried out a study of the design of the Chernobyl reactor, the events which led to the accident, and its consequences. The causes ofthe accident were examined to ascertain whether they revealed anyshortcomings in the safety of CANDU reactors sequence. A list of errorsand violations of procedures at Chernobyl is included.

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.

Papers and lectures from an international seminar on various heat and mass transfer aspects involved in severe accidents in nuclear power reactors.

Application of Thermo-Fluidic Measurement Techniques: An Introduction provides essential measurement techniques in heat transfer and aerodynamics. In addition to a brief, but physically elaborate description of the principles of each technique, multiple examples for each technique are included. These examples elaborate all the necessary details of (a) test setups, (b) calibration, (c) data acquisition procedure, and (d) data interpretation, with comments on the limitations of each technique and how to avoid mistakes that are based on the authors' experience. The authors have different expertise in convection heat transfer and aerodynamics, and have collaborated on various research projects that employ a variety of experimental techniques. Each author has a different view and approach to individual experimental techniques, but these views complement each other, giving new users of each technique a rounded view. With the introduction of this valuable reference book, the reader can quickly learn both the overall and detailed aspects of each experimental technique and then apply them to their own work. Contains both basic principles and fundamental, physical descriptions Provides examples that demonstrate how each experimental technique can be used for industrial testing and academic research in heat transfer and aerodynamics Includes practical and in-depth examples for each technique, with comments on each experimental technique based on the authors' experiences, including limitations and trial errors with some examples of data interpretation Combines classical techniques in aerodynamics and

conduction/convection heat transfer with modern, cutting-edge approaches Collates the information about various pointwise and whole field velocity and thermal measurement techniques in a single resource

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

Advances of Computational Fluid Dynamics in Nuclear Reactor Design and Safety Assessment presents the latest computational fluid dynamic technologies. It includes an evaluation of safety systems for reactors using CFD and their design, the modeling of Severe Accident Phenomena Using CFD, Model Development for Two-phase Flows, and Applications for Sodium and Molten Salt Reactor Designs. Editors Joshi and Nayak have an invaluable wealth of experience that enables them to comment on the development of CFD models, the technologies currently in practice, and the future of CFD in nuclear reactors. Readers will find a thematic discussion on each aspect of CFD applications for the design and safety assessment of Gen II to Gen IV reactor concepts that will help them develop cost reduction strategies for nuclear power plants. Presents a thematic and comprehensive discussion on each aspect of CFD applications for the design and safety assessment of nuclear reactors Provides an historical review of the development of CFD models, discusses state-of-the-art concepts, and takes an applied and analytic look toward the future Includes CFD tools and simulations to advise and guide the reader through enhancing cost effectiveness, safety and performance optimization

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.

Fluid flow and heat transfer processes play an important role in many areas of science and engineering, from the planetary scale (e.g., influencing weather and climate) to the microscopic scales of enhancing heat transfer by the use of nanofluids; understood in the broadest possible sense, they also underpin the performance of many energy systems. This topical Special Issue of Energies is dedicated to the recent advances in this very broad field. This book will be of

interest to readers not only in the fields of mechanical, aerospace, chemical, process and petroleum, energy, earth, civil ,and flow instrumentation engineering but, equally, biological and medical sciences, as well as physics and mathematics; that is, anywhere that “fluid flow and heat transfer” phenomena may play an important role or be a subject of worthy research pursuits.

The Three Mile Island and Chernobyl nuclear incidents emphasized the need for the world-wide nuclear community to cooperate further and exchange the results of research in this field in the most open and effective manner. Recognizing the roles of heat and mass transfer in all aspects of fission-product behavior in sever reactor accidents, the Executive Committee of the International Centre for Heat and Mass Transfer organized a Seminar on Fission Product Transport Processes in Reactor Accidents. This book contains the eleven of the lectures and all the papers presented at the seminar along with four invited papers that were not presented and a summary of the closing session.

This report contains practical guidance for performing accident analysis for nuclear power plants with pressurised heavy water reactors, based on current international good practice. It covers key aspects required including selection of initiating events and acceptance criteria, computer codes and modelling assumptions, the preparation of input data, presentation of results and quality assurance.

Severe Accidents in Nuclear Reactors: Corium Retention Technologies and Insights presents an authoritative and practical analysis of the latest severe accident management strategies based on previous events and experiments. Written for utilities and industries operating and researching nuclear cooled reactor power plants, this book presents the exponential growth in research since major nuclear accidents and acts as a guide to retaining molten corium, both inside and outside the reactor vessel. Sections cover the physics behind several complex phenomena occurring during corium coolability, providing the reader with an in-depth understanding by presenting the insights obtained from simulated severe accidents. In addition, the book validates several severe accident codes and provides evidence on the termination of severe accident progressions to help the reader evaluate the safety of existing reactors and design the next generation of nuclear reactors. Provides a step-by-step guide to various severe accident management experiments Includes evidence on the termination of severe accident progressions Validates several severe accident codes

Each volume contains proceedings of the annual conference of the American Nuclear Society.

In a postulated severe accident scenario, a fuel channel in the core of a CANDU reactor becomes blocked and the fuel melts. The molten fuel may be ejected into the surrounding moderator. This report examines the existing literature relevant to the possibility of a fuel coolant interaction under these circumstances. Four experimental studies are identified and discussed in which the initial ejection of molten fuel into coolant approximates the postulated accident scenario. Currently available codes for predicting fuel coolant interaction are also reviewed. Finally, an experimental program is proposed to supplement the existing data base and resolve the probability of a fuel coolant interaction under forced mixing conditions.