Nuclear Blanket And Shielding Problems In Demonstration | 4f6bb9f670aed4e664b5d994cafd7b52

ERDA Energy Research AbstractsThermal Design of Nuclear ReactorsERDA.Nuclear NewsTokamak Experimental Power Reactor StudiesINIS AtomindexNuclear Fusion ReactorsModern Energy TechnologyJournal of Nuclear Science and TechnologyProceedingsCurrent ProgramsProceedings of the magnetic fusion energy blanket & shield workshopNational TopicsProceedings of the National Topics in Reactor Physics and ShieldingReactor Physics Calculations For Applications In Nuclear Technology – Proceedings Of The WorkshopAdvances in Nuclear Science and TechnologyNuclear Science AbstractsProceedings of the Topical Meeting on the Technology of Controlled Nuclear FusionNuclear Cross Sections for TechnologyFusion Nuclear SciencePathways AssessmentNuclear Science and EngineeringFusion NeutronicsControlled Nuclear FusionSafety Issues Associated with Plutonium Involvement in the Nuclear Fuel CycleFusion Energy UpdateCalculational Methods for Nuclear Heating and Neutronics and Photonics Design for CTR Blankets and ShieldsFusion Reactor Design ProblemsFusion Reactor Blanket/shield Design StudyNuclear Science AbstractsExperimental Breeder Reactor-II (EBR-II) Shield DesignERDA Energy Research AbstractsFusion TechnologyNBS Special Publication Emerging Nuclear Energy Systems: ICenes ’93 – Proceedings Of The Seventh International ConferenceERDA energy research abstractsEnergy Research AbstractsNuclear Technology/fusionProceedings of an International Conference on Neutron Physics and Nuclear Data for Reactors and Other Applied PurposesEnergy Research AbstractsERDA Energy Research AbstractsRadiation Shielding and DosimetryThe "VOLGA" conferences, hosted in odd-numbered years by the Department of Theoretical and Experimental Reactor Physics of the Moscow Engineering Physics Institute (MEPhI), are some of the most prestigious technical meetings held in Russia. Traditionally, these conferences present the opportunity for reactor physicists from around the world to gather at MEPhI's holiday camp on the banks of the Volga river (near Tver) to exchange ideas and explore innovative concepts related to nuclear power development. In 1997, NATO became involved in the "VOLGA" meetings for the first time by co-sponsoring "VOLGA'97" as an advanced research workshop. This workshop broke with tradition a bit in that the venue was moved from MEPhI's holiday camp to a location nearer Moscow. The workshop program was effectively organized in order to cover a broad range of topics relating to the theme of the meeting. Generally, the papers concerned safety related questions associated with utilizing both weapons-grade and reactor-grade plutonium in the nuclear fuel cycle, including facility requirements, licensing issues, proliferation risks, and a variety of advanced concepts for alternative fuel cycles. The program contained a total of ninety-nine papers presented in five days of sessions.Treats not only the physical, but the technological, ecological, and economic basis for using controlled nuclear fusion to produce energy. Topics on the development of fusion are examined without reference to the currently favored magnetic confinement and tokamak lines of fusion research except where problems are specific to them, in the case of a tokamak with deuterium-tritium plasma, for example. Discusses other less developed but potentially promising concepts for the future production of powerful neutron sources.To overcome the problems of system theory and network theory over real field, this book uses matrices over the field F(z) of rational functions in multi-parameters describing coefficient matrices of systems and networks and makes systems and network description over F(z) and their characteristic polynomial; type-l matrix and two basic properties; variable replacement conditions for independent parameters; structural controllability and observability of linear systems over F(z); separability, reducibility, controllability, observability and structural conditions of networks over F(z), and so on. This book involves three subjects: systems, networks and matrices over F(z), which is an achievement of interdisciplinary research.Of reactor physics -- Reactor systems -- Fuel-road design -- Forced-convection heat transfer -- Boiling heat transfer -- Fluid flow -- Safety analysis -- Core thermohydraulic design -- Steam cycles -- Fusion reactors -- Temperature distribution following sudden total power stop -- Progression factors of coolant temperature problems. This book provides a systematic and comprehensive introduction to fusion neutronics, covering all key topics from the fundamental theories and methodologies, as well as a wide range of fusion system designs and experiments. It is the first-ever book focusing on the subject of fusion neutronics research. Compared with other nuclear devices such as fission reactors and accelerators, fusion systems are normally characterized by their complex geometry and nuclear physics, which entail new challenges for neutronics such as complicated modeling, deep penetration, low simulation efficiency, multi-physics coupling, etc. The book focuses on the neutron characteristics of fusion systems and introduces a series of theories and methodologies that were developed to address the challenges of fusion neutronics. Further, it introduces readers to the unique principles and procedures of neutronics design, experimental methodologies and methodologies for fusion systems. The book not only highlights the latest advances and trends in the field, but also draws on the experiences and skills collected in the author’s more than 40 years of research. To make it more accessible and enhance its practical value, various representative examples are included to illustrate the application and efficiency of the methods, designs and experimental techniques discussed. With the strong commitment of the US to the success of the ITER burning plasma mission, and the project overall, it is prudent to consider how to take the most advantage of this investment. The introduction of energy from fusion has been a long sought goal, and the subject of several programmatic investigations and time line proposals [1]. The nuclear aspects of fusion research have largely been avoided experimentally for practical reasons, resulting in a strong emphasis on plasma science. Meanwhile, ITER has brought into focus how the interface between the plasma and engineering/technology, presents the most challenging problems for design. In fact, this situation is becoming the rule and no longer the exception. ITER will demonstrate the deposition of 0.5 GW of neutron heating to the blanket, deliver a heat load of 10–20 MW/m2 or more on the divertor, inject 50–100 MW of heating power to the plasma, all at the expected size scale of a power plant. However, in spite of this, an ITER fusion power plant, ITER will present technologies relevant power plant, ITER will provide technologies relevant to the fusion power plant, and will purchase its tritium entirely from world reserves accumulated from decades of CANDU reactor operations. Such a decision for ITER is
technically well founded, allowing the use of conventional materials and water coolant, avoiding the thick tritium breeding blankets required for tritium self-sufficiency, and allowing the concentration on burning plasma and plasma-engineering interface issues. The neutron fluence experienced in ITER over its entire lifetime will be ~ 0.3 MW-yr/m², while a fusion power plant is expected to experience 120-180 MW-yr/m² over its lifetime. ITER utilizes shielding blanket modules, with no tritium breeding, except in test blanket modules (TBM) located in 3 ports on the midplane [2], which will provide early tests of the fusion nuclear environment with very low tritium production (a few g per year). A description of the EBR-II shield and the methods employed in arriving at the final design are presented. The major shield design problems for that reactor are enumerated and discussed. This workshop was designed to meet the needs of those currently involved in or are planning a nuclear programme involving research and/or power fission reactors. The workshop had a broad scope including not only fission reactor core calculations, but also safety, fuel management, waste disposal reactor licensing. The lectures and computer exercises covered almost all aspects of the operation of fission reactors. This workshop introduced participants to the methods currently used in fission reactor calculations and to some computer codes in which these methods are used. An up-to-date reference and text that discusses the design of shields for radioactive sources, X-ray machines, low energy accelerators, and nuclear reactors. Introduces dosimetry in industry and medicine, examining the prediction and measurement of dose in the body from external and internal sources, and the biological effects of ionization radiation. The unified treatment emphasizes recent practice and includes modern computer methods and results. And, the considerable data presented in tabular and graphical forms provide a ready reference that minimizes the need for supplementary literature. John Maynard Keynes is credited with the aphorism that the long-term view in economics must be taken in the light that "in the long-term we are all dead". It is not in any spirit of gloom however that we invite our readers of the sixteenth volume in the review series, Advances in Nuclear Science and Technology, to take a long view. The two principal roles of nuclear energy lie in the military sphere – not addressed as such in this serie – in the sphere of the centralised production of power, and chiefly electricity generation. The immediate need for this latter has receded in the current era of restricted economies, vanishing growth rates and occasional surpluses of oil on the spot markets of the world. Nuclear energy has its most important role as an insurance against the hard times to come. But will the demand come at a time when the current reactors with their heavy use of natural uranium feed stocks are to be used or in an era where other aspects of the fuel supply must be exploited? The time scale is sufficiently uncertain and the duration of the demand so unascertainable that a sensible forward policy must anticipate that by the time the major demand comes, the reasonably available natural uranium may have been largely consumed in the poor convertors of the current thermal fission programme. A joint study of tokamak reactor first-wall/blanket/shield technology was conducted by Argonne National Laboratory (ANL) and McDonnell Douglas Astronautics Company (MDAC). The objectives of this program were the identification of key technological limitations for various tritium-breeding-blanket design concepts, establishment of a basis for assessment and comparison of the design features of each concept, and development of optimized blanket designs. The approach used involved a review of previously proposed blanket designs, analysis of critical technological problems and design features associated with each of the blanket concepts, and a detailed evaluation of the most tractable design concepts. Tritium-breeding-blanket concepts were evaluated according to the coolant. The ANL effort concentrated on evaluation of lithium- and water-cooled blanket designs while the MDAC effort focused on helium- and molten salt-cooled designs. A joint effort was undertaken to provide a consistent set of materials property data used for analysis of all blanket concepts. Generalized nuclear analysis of the tritium breeding performance, an analysis of tritium breeding requirements, and a first-wall stress analysis were conducted as part of the study. The impact of coolant selection on the mechanical design of a tokamak reactor was evaluated. Reference blanket designs utilizing the four candidate coolants are presented.