

# **Fast Reactor Safety**

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#### **Fast Reactor Safety:**

Fast Reactor Safety John Graham, 2012-12-02 Fast Reactor Safety deals with safety design criteria and methodology for fast reactors Topics covered include safety evaluation methods system disturbances containment and licensing The characteristics of fast reactors including heat ratings and coolants are also discussed Comprised of six chapters this book opens with an overview of methods used to evaluate nuclear safety along with neutron kinetics thermal and feedback effects and fault tree analysis The reader is then introduced to possible system disturbances in relation to three distinct fast reactor systems liquid metal cooled fast breeder reactors gas cooled fast breeder reactors and steam cooled fast breeder reactors The next chapter looks at safety criteria that are set to define the design of a safe plant together with the safety features that might be included The remaining chapters focus on the particular problems of a sodium cooled design containment building and primary circuit and vessel containment and licensing of the plant This monograph is intended for graduates and undergraduates in nuclear engineering who are attending courses in reactor safety **Proceedings of the 1990** International Fast Reactor Safety Meeting ,1990 Proceedings of the International Topical Meeting on Fast Fast Reactor Fuel Type and Reactor Safety Performance, 2009 Fast Reactor Fuel Type and Reactor Safety ,1985 Reactor Safety Performance R Wigeland Idaho National Laboratory J Cahalan Argonne National Laboratory The sodium cooled fast neutron reactor is currently being evaluated for the efficient transmutation of the highly hazardous long lived transuranic elements that are present in spent nuclear fuel One of the fundamental choices that will be made is the selection of the fuel type for the fast reactor whether oxide metal carbide nitride etc It is likely that a decision on the fuel type will need to be made before many of the related technologies and facilities can be selected from fuel fabrication to spent fuel reprocessing A decision on fuel type should consider all impacts on the fast reactor system including safety Past work has demonstrated that the choice of fuel type may have a significant impact on the severity of consequences arising from accidents especially for severe accidents of low probability. In this paper the response of sodium cooled fast reactors is discussed for both oxide and metal fuel types highlighting the similarities and differences in reactor response and accident consequences Any fast reactor facility must be designed to be able to successfully prevent mitigate or accommodate all consequences of potential events including accidents This is typically accomplished by using multiple barriers to the release of radiation including the cladding on the fuel the intact primary cooling system and most visibly the reactor containment building More recently this has also included the use of inherent safety concepts to reduce or eliminate the potential for serious damage in some cases Past experience with oxide and metal fuel has demonstrated that both fuel types are suitable for use as fuel in a sodium cooled fast reactor However safety analyses for these two fuel types have also shown that there can be substantial differences in accident consequences due to the neutronic and thermophysical properties of the fuel and their compatibility with the reactor coolant with corresponding differences in the challenges presented to the reactor

developers Accident phenomena are discussed for the sodium cooled fast reactor based on the mechanistic progression of conditions from accident initiation to accident termination whether a benign state is achieved or more severe consequences are expected General principles connecting accident phenomena and fuel properties are developed from the oxide and metal fuel safety analyses providing guidelines that can be used as part of the evaluation for selection of fuel type for the sodium cooled fast reactor Proceedings of the 1990 International Fast Reactor Safety Meeting International Fast Reactor Safety **Proceedings of the International Topical Meeting on Fast Reactor Safety** Meeting, 1990, Snowbird, Utah, 1990 **Nuclear Reactor Safety** F Farmer, 2012-12-02 Nuclear Reactor Safety aims to put the nuclear hazard in perspective by providing an objective overall technical review of the field It focuses on reactor accidents and their consequences The technical arguments will be concerned broadly with reactor accident conditions and will deal with both the arrangements necessary to prevent any dangerous diversion from normal operation and to ameliorate the consequences if such a diversion should occur The book is organized into three parts Part I describes the nature of fission products and the hazards to man and his environment resulting from the uncontrolled release of fission products in accident conditions Part II discusses a quantitative approach to reactor safety assessment and the quantification of vessel integrity Part III deals with the basic principles of analysis and assessment of reactor safety and then considers the specific safety problems of thermal and fast reactors in detail This book is intended for two types of readers First are technicians those engaged in nuclear engineering designers constructors and operators of nuclear stations as well as those who would make a career in nuclear safety Second are those not necessarily scientists who are tasked with making decisions in the field of energy use and allocation or are concerned with environmental matters Safety of Sodium-Cooled Fast Reactors Songbai Cheng, Ruicong Xu, 2021-09-28 This book highlights the advances and trends in the safety analysis of sodium cooled fast reactors especially from the perspective of particle bed related phenomena during core disruptive accidents A sodium cooled fast reactor SFR is an optimized candidate of the next generation nuclear reactor systems Its safety is a critical issue during its R D process The book elaborates on research progresses in particle bed related phenomena in terms of the molten pool mobility the molten pool sloshing motion the debris bed formation behavior and the debris bed self leveling behavior The book serves as a good reference for researchers professionals and postgraduate students interested in sodium cooled fast reactors Knowledge provided is also useful for those who are engaging in severe accident analysis for lead cooled fast reactors and light water reactors Proceedings of the 1990 International Fast Reactor Safety Meeting American Nuclear Society, International Fast Reactor Safety Meeting, 1990, Snowbird, Utah, 1990 **Proceedings of the** International Meeting on Fast Reactor Safety and Related Physics, October 5-8, 1976, Chicago, Illinois: Invited papers, panels, summary ,1977 Proceedings of the International Meeting on Fast Reactor Safety Technology, Seattle, Washington, August 1923, 1979, 1979 An Appreciation of Fast Reactor Safety United Kingdom Atomic Energy

Authority, 1970 Reactor Safety ,1971 An Evaluation of Gas-cooled Fast Reactor Oak Ridge National Laboratory, 1969 Fast Reactor Safety American Nuclear Society. Nuclear Reactor Safety Division, 1985 Proceedings of the 1990 International Fast Reactor Safety Meeting ,1990 **Proceedings of the 1990 International Fast Reactor Safety** Meeting American Nuclear Society, International Fast Reactor Safety Meeting. 1990, Snowbird, Utah, Nihon Genshiryoku Gakkai, American Nuclear Society. Eastern Idaho Section, 1990 Sodium-cooled Fast Reactors Masaki Morishita, Hirovuki Ohshima, 2022-07-22 Sodium cooled Fast Reactors is the third volume in the JSME Series on Thermal and Nuclear Power Generation which presents a comprehensive view of the latest research and activities from around the globe Volume Editors Masaki Morishita and Hiroyuki Ohshima along with their team of expert contributors combine their knowledge and experience to provide a solid understanding of the history of SFRs and work carried out in Japan to date This book uniquely includes case studies from these global regions to highlight SFR uses benefits and challenges focusing on their safety design operation and maintenance Unique to this publication the JSME cover key technological advances which will shape power generation of the future including developments in the use of AI for design Drawing on their unique experience the authors pass on lessons learned and best practices to support professionals and researchers in their development and design of this advanced reactor type Written by the leaders and pioneers in nuclear research at the Japanese Society of Mechanical Engineers and draws upon their combined wealth of knowledge and experience Includes real examples and case studies mainly from Japan to provide a deeper learning opportunity with practical benefits Considers the societal impact and sustainability concerns and goals throughout the discussion Includes safety factors and considerations as well as unique results from performance testing of SFR systems **TID.** .19?? Nuclear Safety Research Index: Fast reactors OECD Nuclear Energy Agency. Committee on the Safety of Nuclear Installations, 1979

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