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Simulation-based analysis of lifetime reliability and availability for Electrical Systems in High Temperature Gas Reactors

Abstract:

This seminar presents the results of a comparative analysis of lifetime reliability and Forced Outage Rate (FOR) for electrical systems of HTTR, GEMINI+ and the new HTGR concept being developed by NCBJ. The system analysis has been performed followed by the Fault Trees (FT) and Reliability Block Diagrams (RBD) for both Normal Operation (NO) and Emergency Conditions (EC). The presented results focus on the Reliability and Availability of HTGR electrical systems under conditions of failure to operate and short circuit events of individual equipment. The initial calculation was performed for the standard configuration of the system and then several modifications of the design have been proposed, aiming at the reliability enhancement. The results of this work are highly practical by using a common set of reliability data which enables efficient comparison of the models in terms of Reliability, Availability and also confirms the high reliability of the systems during Emergency Conditions. In order to improve FOR proposes novel design solutions to ensure better Reliability results in Normal Operation, which is inextricably linked with the profitability of the HTGR-based facilities.

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Bio:
Grzegorz Mrugała is an R&D specialist, and has more than 5 years of development and supervising of industrial and public utility electrical systems. He graduated Faculty of Electrical Engineering at the Warsaw University of Technology and Power Engineering at the Military University of Technology. He gained experience at work on the construction site of the Olkiluoto 3 Nuclear Power Plant. Currently working in National Centre for Nuclear Research at the Division of Nuclear Energy and Environmental Studies.