



Seminarium Zakładu Energetyki Jądrowej i Analiz Środowiska (UZ3)
Departament Badań Układów Złożonych (DUZ)
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Simulation of Species Transfer Processes in Molten Salt Reactors

Abstrakt:

A tool was developed for calculating the evolution of MSR component material compositions under various species transfer processes. The tool utilizes the reprocessor function within Serpent 2 which uses a modified Bateman equation for fuel depletion. This reprocessor function was verified against analytical solutions to determine the behavior and limits of the function. This work focused on the application of the species transfer tool on an MSRE-like reactor to (1) determine the target reprocessing rates and (2) the acceptable graphite adsorption parameters based on final waste classification. Preliminary results identified the neutronically important elements for reprocessing and the effects of a charge balance approximation during reprocessing and refilling. In particular, the results revealed that depletion calculations with continuous reprocessing are necessary to obtain the correct keff results, as opposed to simple criticality calculations with perturbation of a depleted fuel composition, due to hysteresis from precursors of neutronically important species.

Serdecznie zapraszamy
Tomasz Kwiatkowski, Mariusz Dąbrowski

Bio:

Tomasz Kozłowski has is a professor at the University of Illinois at Urbana-Champaign. He received his Ph.D. in Nuclear Engineering from Purdue University in 2005, where he worked on spatial homogenization methods for transport calculation, multi-physics RELAP5/PARCS and TRACE/PARCS coupling and PARCS code development. Later, he worked at the Division of Nuclear Power Safety at the Royal Institute of Technology (KTH) in Stockholm, Sweden, where he taught numerical methods and conducts researcher on BWR stability, BWR safety analysis and multi-physics coupling methods for deterministic safety analysis. At University of Illinois, he worked on uncertainty quantification of single- and multi-physics codes (RELAP5, TRACE, VERA-CS), numerical methods for fluid flow, and BWR spent fuel criticality safety.