# Assessing Reactor Physics Codes Capabilities to Simulate Fast Reactors on the Example of the BN-600 Benchmark

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**Abstract:**

In the framework of the collaboration between SECNRS and GRS, this work aims to check the capabilities of their reactor physics codes (initially validated for thermal reactors) to simulate fast sodium cooled reactors. The BFS-62-3A critical experiment (steady-state) from the BN-600 Hybrid Core Benchmark Analyses was chosen for the study. Monte-Carlo codes (KENO from SCALE and SERPENT 2.1.23) and diffusion code (DYN3D-MG) are applied to calculate related neutronic parameters.

It was found that multiplication factor and reactivity effects (Sodium Void Reactivity Effect (SVRE), rods weight) calculated by KENO and SERPENT using the ENDF/B-VII.0 continuous energy library are in agreement between each over and measured benchmark values. To enable performing of analysis with DYN3D-MG, few-groups macroscopic cross sections are required. Different methods for cross section processing implemented in SCALE and SERPENT was applied to prepare few-group macroscopic libraries. Simplified benchmark model was applied for DYN3D-MG with corresponding cross-sections verification. DYN3D-MG results of the benchmark with cross sections libraries generated by SECNRS and GRS show reasonable agreement with results from Monte-Carlo calculations and measured values. This work is a start point for the future SFR coupled deterministic safety analysis.