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Verification of HELIOS-MASTER System through Benchmark of Critical Experiments

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Abstract

The HELIOS-MASTER code system is verified through the benchmark of the critical experiments that were performed by RRC "Kurchatov Institute" with water-moderated hexagonally pitched lattices of highly enriched Uranium fuel rods (80w/o). We also used the same input by using the MCNP code that was described in the evaluation report, and compared our results with those of the evaluation report. HELIOS, developed by Scandpower A/S, is a two-dimensional transport program for the generation of group cross-sections, and MASTER, developed by KAERI, is a three-dimensional nuclear design and analysis code based on the two-group diffusion theory. It solves neutronics model with the AFEN (Analytic Function Expansion Nodal) method for hexagonal geometry. The results show that the HELIOS-MASTER code system is fast and accurate enough to be used as nuclear core analysis tool for hexagonal geometry.