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Development and Applications of Nuclear Design and Safety Assessment Program SuperMC for Fast Reactor

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Abstract:

Compared with the other reactor types, the neutron spectrum of fast reactors is hard, affecting the neutronics and safety performance, for which advanced nuclear simulation methods such as Monte Carlo method is necessary for the nuclear design. Super Monte Carlo Simulation Program for Nuclear and Radiation Process (SuperMC) is a general, intelligent, accurate and precise program for the design and safety evaluation of nuclear system including fast reactors. The latest version of SuperMC can accomplish the n, γ transport calculation and depletion calculation, and is integrated with CAD-based automatic modeling, visualization and cloud computing framework. More than 2000 benchmark models and experiments have been duly verified and validated, including the nuclear analyses of fast reactor benchmark BN600, BFS2, etc. Moreover, SuperMC has been applied in the core and shielding design and analysis of a fast reactor, the China Lead-based Research Reactor (CLEAR).

Keywords: SuperMC; Nuclear Design and Safety Evaluation Program; Fast Reactors; CLEAR

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