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NUCLEAR REACTOR SIMULATIONS: A BIAS QUANTIFICATION OF NEUTRON LEAKAGE IMPACT

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Monte Carlo codes are often used in nuclear reactor simulations to realize fuel evolutions as a function of time, in order to know the spent fuel composition at the end of the irradiation cycle.
The evolution of the entire reactor core is not possible with stochastic codes, because of the source convergence problem and the too costly machine time required.
So, a simple reactor model is adopted for calculations: instead of about 200 assemblies, differing for composition and irradiation level, a single entirely reflected assembly is simulated. The assembly model lies on many hypotheses, such as the neglecting of control rods and boron concentration for power regulation.
Since the geometry has reflecting boundary conditions, neutrons can not escape from the assembly. Taking into account or neglecting neutron leakage can lead to important biases in reactor simulations, since it has a strong impact on neutron spectrum. At the present time, homogeneous leakage models exist and are implemented in some Monte Carlo codes.
The study of neutron axial leakage and the comparison with leakage models will be presented.

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