

CBGLIB : A Multi-group Neutron Library for Accurate Neutronics Simulation

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Accurate self-shielded multi-group cross sections are necessary for reliable neutronics simulations in nuclear reactor design. One way to improve the accuracy of the multi-group cross sections is to increase the number of energy groups of multi-group libraries. Increase in the number of energy groups, however, results in increase in computation cost.

The author has developed an integrated neutronics simulation code system, CBG. For CBG, we have developed a multi-group neutron library, CBGLIB. While CBGLIB has the same coarse group structure as the SRAC library (107-group), its performance is better than the SRAC library by virtue of the following techniques: (1) energy-group- and nuclide-dependent Bell factor is adopted, (2) multiple R-parameters to consider resonance interferences with other nuclides are adopted, and (3) Bell factor is adjusted to cancel out the error caused by coarse-group structure.

CBGLIB has been verified through pin-cell and TCA core calculations.