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Verification and Validation Activities with OpenMC

Wednesday, 12 October 2022 11:00 (30 minutes)

This talk will give a broad overview of the verification and validation activities being performed using the OpenMC particle transport code. The OpenMC community has relied extensively on benchmark models from the ICSBEP handbook for both cross-code comparisons and comparison to experiment. To date, about 400 different benchmark models from ICSBEP have been created with OpenMC. Along with this, a set of Python tools has been developed for automating the execution and analysis of benchmark simulations. Separately, tools have been developed for cross-code comparison of simple broomstick and spherical shell models that have been invaluable for neutron and photon physics validation.

Recently, a set of OpenMC models based on ICSBEP benchmarks has been created for inclusion in the CoNDERC repository, taking advantage of the unique capabilities in OpenMC. These benchmarks go beyond simple evaluation of k-eff and include reaction rate tallies, spatial flux profiles, and other physical measures. These additions to CoNDERC lay the groundwork for future additions of OpenMC models focused on other areas (e.g., SINBAD benchmarks for shielding/fusion applications).

Two pathways for converting MCNP models to OpenMC models currently exist: the csg2csg converter developed by Andy Davis and a more recent project called openmc_mcnp_adapter. These capabilities provide another useful resource for performing cross-code comparison. These efforts will be discussed, in particular how they fit in to the overall V&V activities with OpenMC and promising areas for future work.

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