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Cloud-based Neutron Transport Simulations and Variance Reduction with OpenMC

Thursday, 11 May 2023 16:30 (2 hours)

Monte Carlo simulations are used to model neutron transport through matter for estimating backgrounds or to design adequate shielding for radiation safety. Detailed neutronics calculations require thorough descriptions of the geometry, so that the influence of all physical features and materials are captured. It is most convenient to import existing CAD models into Monte Carlo software to capture the needed precision in the simulation model. Variance Reduction algorithms are applied to enhance neutron fluxes on the far side of thick shielding for more accurate estimation.

We will describe the open-source OpenMC simulation code and its application to shielding design. We will show new variance reduction capabilities with applications for deep shielding problems. We will also demonstrate this with simulations of neutron fluxes from the Takasaki Ion Accelerator for Advanced Radiation Application (TIARA) shielding experiment. Finally, we will demonstrate a novel browser-based graphical user interface for the OpenMC software that offloads CPU-intensive simulation tasks to cloud computing resources.

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Footnotes

I have read and accept the Privacy Policy Statement

Yes

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