Contribution ID: **25300** Type: **Extended Abstract**

Development and Validation of an OpenMC-Based Neutronic Model of the OPAL Research Reactor for Research and Educational Applications

Tuesday, 4 November 2025 13:45 (15 minutes)

This study presents the development and validation of a detailed neutronic model of the Open Pool Australian Light water (OPAL) research reactor using OpenMC, an open-source Monte Carlo particle transport code. The OPAL reactor is a 20 MW pool-type facility utilizing low-enriched uranium (LEU) U_3Si_2-Al dispersion fuel assemblies and equipped with five control rods. The reactor serves multiple purposes, including radioisotope production, materials testing, and neutron beam research.

This validated model provides a reliable computational framework for future high-fidelity studies involving control rod worth, power distributions, and burnup analysis. It also demonstrates the capability of OpenMC for full-core modeling of complex pool-type research reactors, supporting its application in core design, safety analysis, and performance evaluation.

Technical Track

Reactor Physics

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Session Classification: Fusion and Advanced Reactors