

NUCLEAR ENERGY UNIVERSITY PROGRAMS

Verification of the CENTRM Module for Adaptation of the SCALE Code to NGNP Prismatic and PBR Core Designs

PI: Ganapol, Barry - University of Arizona

Collaborators:

None

Project Number: 09-807

Initiative/Campaign: Gen IV/Methods

Abstract

The generation of multigroup cross sections lies at the heart of the very high temperature reactor (VHTR) core design, whether the prismatic (block) or pebble-bed type. The design process, generally performed in three steps, is quite involved and its execution is crucial to proper reactor physics analyses. The primary purpose of this project is to develop the CENTRM cross-section processing module of the SCALE code package for application to prismatic or pebble-bed core designs. The team will include a detailed outline of the entire processing procedure for application of CENTRM in a final report complete with demonstration. In addition, they will conduct a thorough verification of the CENTRM code, which has yet to be performed. The tasks for this project are to:

- Thoroughly test the panel algorithm for neutron slowing down.
- Develop the panel algorithm for multimaterials.
- Establish a multigroup convergence 1D transport acceleration algorithm in the panel formalism.
- Verify CENTRM in 1D plane geometry.
- Create and test the corresponding transport/panel algorithm in spherical and cylindrical geometries.
- Apply the verified CENTRM code to current VHTR core design configurations for an infinite lattice, including assessing effectiveness of Dancoff corrections to simulate TRISO particle heterogeneity.