

ORNL SEMINAR

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Multipanel Formulation for Neutron Slowing Down

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The generation of multigroup cross sections lies at the heart of reactor physics methods. The process, generally performed in three steps, can be quite involved and its execution is crucial to proper reactor physics analyses. After raw data processing of experimentally determined cross sections and appropriate vetting and archiving of the data, the **CENTRM** module (of the **SCALE** Code Package) allows data access for manipulation into multigroup data sets. **CENTRM** incorporates from 10,000 to 70,000 data points into the solution of the neutron slowing down equation to capture resonance self-shielding effects appropriately. In this presentation, first we investigate the origin of the pointwise slowing down equation. We then reformulate its solution into a series of energy (group) panel solutions. The key feature emphasized is decomposition of the original calculation into a series of lower dimensional solutions to reduce computational effort. We demonstrate scaling of the solution for slowing down in multi-resonances. In addition, a multipoint interpolation of material cross sections at different energy points will be proposed. Finally, we conclude with a discussion of how to include a 1D spatial component in plane and curvilinear geometries in both the transport and diffusion approximations.

It is my hope that the solution presented is viewed as a technique to independently verify the **CENTRM** algorithm and its further development encouraged.