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An Unresolved Resonance Evaluation for ^{235}U

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Abstract

A criticality safety calculation for a nuclear system with an energy spectrum that peaks in the intermediate energy region requires accurate neutron cross-sections in the resolved and unresolved energy regions. A resolved resonance region evaluation of the ^{235}U cross section was performed in the 90's and the evaluation has greatly improved the results of benchmark calculations.[1] Average values of the Reich-Moore resonance parameters obtained in the resonance region were used to initiate a new resonance evaluation of the ^{235}U cross sections in the unresolved energy region. The experimental data used in the analysis consisted of high-resolution transmission data measured by Harvey *et al.*[2] at the Oak Ridge Electron Linear Accelerator (ORELA), and fission and capture cross sections measured by Weston *et al.*[3] The evaluation was performed in the energy region from 2.25 keV to 25 keV. The evaluation was carried out using the SAMMY[4] computer code that incorporates a methodology for data evaluation in the unresolved resonance region. SAMMY generates average resonance parameters based on a statistical model analysis of the experimental average cross section and these parameters are converted into the ENDF/B format for use in a Single-Level Breit-Wigner cross-section calculation. From the average resonance parameters, SAMMY also calculates the pointwise cross sections that are converted into the ENDF/B format. Several iterations are needed to determine which is the best set of average resonance parameters and background cross sections to improve benchmark calculations. Several benchmarks were used to test the validity of the parameters. The benchmark calculations were done using the MCNP code and the pointwise MCNP cross section libraries were constructed with the AMPX and NJOY cross section processing codes. The full paper will describe the methodology used to evaluate the ^{235}U unresolved resonance parameters and their use in benchmark calculations.

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References

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