

^{239}Pu Neutron Resonance Parameters Revisited and the Covariance Matrix in the Neutron Energy Range Thermal to 2.5 keV

Herve Derrien, Luiz C. Leal, and Nancy M. Larson
Oak Ridge National Laboratory, Oak Ridge, TN 37831-6171, USA

The previous evaluation of the ^{239}Pu resonance parameters, performed in 1993, was divided into three separate energy ranges: 0 to 1 keV, 1 to 2 keV, and 2 to 2.5 keV. These results were adopted for the ENDF/B-VI, JEFF, and JENDL libraries. Because of the difficulties in handling large covariance matrices, the resonance-parameter covariance file was not available at that time. Recent advancements made at Oak Ridge National Laboratory (ORNL) allow treatment of large resonance-parameter covariance matrices by using faster and larger computers with the improved version of the analysis code SAMMY. The evaluation performed at ORNL between 1985 and 1990 relied on the 1984 fission cross-section measurement of Weston, which was, on average, 3% lower than the ENDF/B-VI standard cross section. New measurements performed by Weston in 1991 at ORNL and by Wagemans in 1993 at the Geel Linear Accelerator (GELINA) confirmed the ENDF/B-VI standard values, showing that the experimental fission cross section used in the resonance-parameter evaluation should be renormalized, at least in the energy range above 30 eV. The parameters released in 1993 were modified slightly to take into account this renormalization. However, a new SAMMY analysis was not performed on the renormalized experimental fission data. In the present work, a SAMMY analysis of the updated experimental database is performed. New resonance parameters are obtained, along with a complete resonance-parameter covariance file in a single energy range from thermal energy to 2.5 keV, which is suitable for the calculation of group cross sections and related covariance data.