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$^{140,142}\text{Ce}$ Neutron Cross Section Resolved Resonance Region Evaluation*

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Abstract

A resolved resonance region evaluation of $^{140,142}\text{Ce}$ has been carried out by Oak Ridge National Laboratory. Requested by the US Nuclear Criticality Safety Program, this evaluation is based on recent high-resolution transmission and capture high-resolution measurements of $^{\text{nat}}\text{Ce}$ and ^{142}Ce conducted at JRC-GEEL at the Geel Linear Accelerator facility, as well as recently measured thermal constants available from the EXFOR database [1]. Starting from the resonance parameters from the ENDF/B-VIII.0 library [2] and following a preliminary R-matrix analysis [3], an updated set of resonance parameters and corresponding covariance information was derived by the fit of these experimental datasets using the Reich-Moore approximation of the R-matrix theory as implemented in the SAMMY code system [4]. The resolved resonance region upper energy limit for ^{140}Ce was kept at 200 keV while the ^{142}Ce resonance region was extended from 13 to 26 keV. This new evaluation was found to be in good agreement not only with several integral quantities of interest to the reactor physics community, but also with the stellar Maxwellian-averaged cross section [5].

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