Unresolved resonance region cross sections by random-matrix approach

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The random-matrix approach has been employed to calculate cross sections in the unresolved resonance region (URR) theoretically [1]. In current Monte-Carlo approaches, the URR parameters are employed for constructing a probability table, and Wigner and chi-square distributions are assumed for calculating the cross sections. However, the random-matrix approach allows us to calculate these cross sections without such assumptions. This approach employs the Gaussian orthogonal ensemble (GOE), which is a real symmetric matrix, and the elements are random numbers that follow the Gaussian distribution. The eigenvalue and its spacing distributions of GOE resemble the distribution of the actual resonance. These statistical properties of GOE are incorporated into the scattering matrix with neutron and gamma-ray transmission coefficients, which are model parameters in this model. We demonstrate that the calculated resonance spacing does not reproduce the Wigner distribution exactly. Moreover, we present the parameter dependence on the cross sections of ^{238}U.

[1] T. Kawano, P. Talou, H. A. Weidenmüller, Physical Review C **92**, 044617 (2015).