

ABSTRACT

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Unified description of the coupled-channels optical model and the statistical Hauser-Feshbach theory for low energy nuclear reactions

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We incorporate the coupled-channels optical model into the statistical Hauser-Feshbach nuclear reaction theory, where the scattering matrix is diagonalized to properly calculate both the transmission coefficient for the excited states and the width fluctuation correction for deformed nuclei by performing the Engelbrecht-Weidenmueller transformation. We further generalize this technique so that all the open channels in a nucleon-induced reaction on a deformed nucleus can be calculated consistently. We show that the calculated neutron inelastic scattering cross section at low energies increases by considering the nuclear deformation effect.

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