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Compound-nuclear formation cross sections for neutrons on excited states of deformed nuclei[1] F.S. DIETRICH, I.J. THOMPSON, Lawrence Livermore National Laboratory, T. KAWANO, Los Alamos National Laboratory — We have carried out coupled-channels calculations of the compound-nuclear formation cross sections on the ground and first-excited states of several nuclei with differing K-values for the ground-state band (^{233}U, $K = \frac{5}{2}$; ^{238}U, $K = 0$; and ^{239}Pu, $K = \frac{1}{2}$). The compound formation cross section, which is the weighted sum of the transmission coefficients used in statistical reaction models, is the nonelastic cross section minus the sum of direct inelastic cross sections. We find that the ratio of the excited to ground-state cross section is very close to unity in all cases (within $\sim$0.1%) over the incident energy range studied (1 keV to 20 MeV). This result requires that sufficient levels be coupled to ensure convergence (approximately 13 levels for odd-A nuclei). The adiabatic model for scattering from deformed nuclei predicts compound formation cross sections that are independent of both the K of the band and the excitation within the band. Our calculations show that the actual cross section ratios are very close to the adiabatic limit, even at very low incident energies.

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