

Barrier Height and Excitation Function Calculations for Nuclear Fusion

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The enhancement of sub-barrier fusion has been interpreted due to coupling between the relative motion and other degrees of freedom. The coupling gives rise to the distribution of fusion barriers and passage over the lowest barrier which is responsible for fusion enhancement at energies below the barrier. There are several orders of magnitude could be considered due to the tunneling through the barrier. The barrier height could be deduced from the measured cross section data for different energies, as well as using many empirical forms for incomplete and complete fusion of two massive nuclei. Firstly, we present a formula for barrier height (ODEFF) and check, over wide ranges of interacting pairs the percentage agreement with those calculated or measured values for all pairs within $Z_P Z_T \leq 3000$. Secondly, the more recently measured excitation functions are studied using four models of nuclear forces, indicating that most of them can be used for wide energy range while the others failed to do so. We refer this notice to the theory deducing the model. For this, the 14 undertaken pairs recover the range $18 \leq Z_P Z_T \leq 1320$.