Iranian Journal of Physics Research, Vol. 23, No. 4, 2024
DOI: 10.47176/ijpr.23.4.81734

Folding model potentials using the LOCV-DDAEI for $^{16}O+^{16}O$ elastic scattering

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(Received 3 August 2023 ; in final form 11 October 2023)

Abstract

The elastic scattering of $^{16}O+^{16}O$ systems at several incident energies are analyzed, in the framework of double folding model, using the density-dependent averaged effective two-body interaction (DDAEI). The DDAEI is generated via the lowest order constrained variational (LOCV) method for the symmetric nuclear matter (SNM), using the input bare Reid68 nucleon-nucleon (NN) potential. A new energy dependent factor, g(E), is introduced to the LOCV-DDAEI to get a more realistic description of heavy ion (HI) scattering, at the different incident energies. It is shown that a linear energy dependent function, provides a good agreement with the energy dependence of the nuclear optical potential, and causes to increase the convergence speed of iteration method in evaluating the exchange part of folded potential, such that the computing time is considerably decreased. The calculated cross sections of the $^{16}O+^{16}O$ systems in the above framework, are compared with the available experimental data. It is demonstrated that a quite good description of HI scattering can be obtained, using the above LOCV-DDAEI, by adjusting the parameters of the linear energy dependent factor, g(E).

Keywords: folding model , LOCV method , elastic scattering , Reid68 potential

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