CALCULATIONS OF nd-SCATTERING CROSS-SECTIONS BY FADDEEV'S METHOD WITH A HYPERSPHERICAL BASIS

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S u m m a r y

An approximate method for calculating nd-scattering cross-sections at energies below the deuteron breakup threshold has been developed. The most complicated term Ψ_C of the complete wave function, which describes a three-nucleon system in the interaction region, has been extracted and expanded into a K-harmonic series. The coefficients of such an expansion are the solutions of integral Faddeev equations. Keeping only a term with $K = 0$ in this expansion and taking the quartet phases with $\ell = 0$ and 1 into account, we have calculated nd-scattering cross-sections for the energy of bombarding neutron ranging from 1.0 to 2.5 MeV. The Malfliet–Tjon, Yukawa, and Hulthen local nucleon-nucleon potentials were used in computations. Two fitting parameters, the phase shift for the state with $\ell = 1$ and the normalization coefficient for Ψ_C, were used, which allowed us to obtain a satisfactory agreement between the calculated cross-sections and the corresponding experimental data. The developed approach enables the problem of finding a three-nucleon wave function for the continuous spectrum with nonseparable interaction to be reduced to the problem of solving a one-dimensional integral equation. This circumstance makes it drastically different from the methods based on the direct numerical solution of two-dimensional integral equations in the momentum representation.