The Algebraic Versions of the Resonating Group Model and the Orthogonality Conditions Model as Fundamentals of Theoretical Approaches for Describing Nuclear Reactions

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The important class of nuclear fusion processes is the radiative capture reactions representing significant interest in particular for nuclear astrophysics. Their cross sections at low energies are suppressed by Coulomb barrier and therefore not available for reliable experimental measurements. For these reason there is the need in theoretical approaches for calculating the cross sections.

In the present work theoretical fundamentals of microscopic and semimicroscopic approaches using expansions over the oscillator functions for description of the radiative capture reactions are reviewed [1]. The former approach is based on the algebraic version of the resonating group model [2], the latter one combines the algebraic versions of the resonating group model and the orthogonality conditions model [3]. The applicability and possibilities of the approaches are demonstrated. The opportunities of the further applications of the approaches are discussed.

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