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Calculation of asymptotic normalization coefficients in the complex-range Gaussian basis

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Complex-range Gaussian basis (CRGB) has been demonstrated to give a convenient representation for bound-state [1] and scattering [2] calculations. The basis functions are constructed from the conventional real-valued Gaussians with additional oscillating factors which makes them suitable for approximation of wave functions of highly excited bound states and continuum states as well. Recently, this basis has been successfully applied for calculation of scattering amplitudes of charged particles within the Coulomb wave-packet formalism [2]. Here we examine the CRGB in evaluation of asymptotic normalization coefficients (ANCs) which represent an important information for a description of nuclear reactions, e.g. for calculation of the radiative capture cross-sections in nuclear astrophysics. It is shown that a diagonalisation procedure for the total Hamiltonian matrix in the CRGB results in approximation for a radial part of the bound state wave function from the origin up to the far asymptotic distances, which allows to extract ANCs rather accurately. The values of the ANC found by this way for test local potentials are in full agreement with the results of the conventional methods. The method will be illustrated by calculations of single-particle ANCs for nuclei bound states in cases of non-local nucleon-nucleus interactions, in particular, phenomenological global potentials with the Perey-Buck's non-locality (see e.g. [3]) and microscopic non-local potentials provided by the Dispersive Optical Model [4].
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