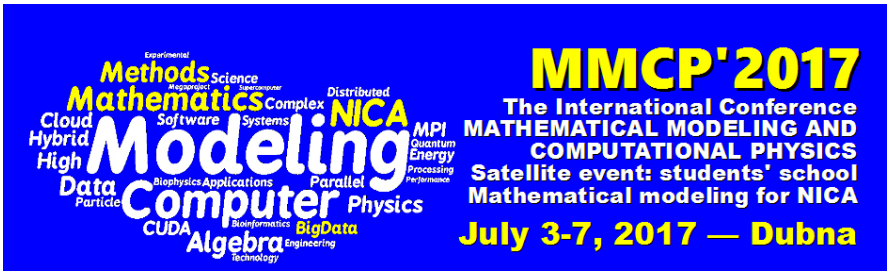

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APPLICATION OF HARMONIC OSCILLATOR BASIS WITH DIFFERENT SIZE PARAMETERS FOR CALCULATION OF GROUND STATE ENERGY OF COULOMB THREE-BODY SYSTEMS

Monday, 3 July 2017 15:45 (15 minutes)

The new harmonic oscillator (HO) expansion method [1] is applied to calculate non-relativistic ground state energy of a number of Coulomb three-particle systems with two identical particles for up to 28 excitation HO quanta. The novelty of the method is the introduction of different size parameters in the Jacobi coordinates instead of only one unique oscillator length parameter in the traditional approach. It has been found that variational calculations of the ground state energies of these systems using the proposed basis with different size parameters converge much faster than in the traditional treatment with only one oscillator length. Particularly, for systems with molecular character the second nonlinear variational parameter is vital for reasonable convergence. The results obtained in basis with different sizes are compared with the ones calculated in traditional basis with the same oscillator length for each Jacobi coordinate and with those given in the literature [2].

Short biography note

[1] A. Deveikis, Problems with translational invariance of three-particles systems, J. Mod. Phys. 7, 290–303 (2016), http://dx.doi.org/10.4236/jmp.2016.73029
[2] E. Z. Liverts and N. Barnea, Three-body systems with Coulomb interaction. Bound and quasi-bound S-states, Comput. Phys. Commun. 184, 2596–2603 (2013), http://dx.doi.org/10.1016/j.cpc.2013.06.013

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