

The Three-Body Coulomb Potential Polynomials

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ABSTRACT

In this paper, we present a general analysis of the three-body Coulomb potential polynomials. We show why the three-body Coulomb wave functions expansion in a non-orthogonal Laguerre-type function basis gives two modified Pollaczek polynomials. The frozen-core model is used to examine the three-body Coulomb Hamiltonian. The resulting three-term recurrence relation is a special case of the Pollaczek polynomials which is a set of orthogonal polynomials having a nonempty continuous spectrum in addition to an infinite discrete spectrum. The completeness of the three-body Coulomb wave functions is further studied for different Laguerre basis size.

Keywords: three-body Coulomb, non-orthogonal Laguerre, Pollaczek polynomial, frozen-core model