

Mathematical Physics

Higher-order SUSY, exactly solvable potentials, and exceptional orthogonal polynomials

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Exactly solvable rationally-extended radial oscillator potentials, whose wavefunctions can be expressed in terms of Laguerre-type exceptional orthogonal polynomials, are constructed in the framework of k -th-order supersymmetric quantum mechanics, with special emphasis on $k=2$. It is shown that for $\mu=1, 2$, and 3 , there exist exactly μ distinct potentials of μ -th type and associated families of exceptional orthogonal polynomials, where μ denotes the degree of the polynomial g_{μ} arising in the denominator of the potentials.

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