

Research Article

On the Complex Zeros of Some Families of Orthogonal Polynomials

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The complex zeros of the orthogonal Laguerre polynomials $L_n^{(a)}(x)$ for $a < -n$, ultraspherical polynomials $P_n^{(\lambda)}(x)$ for $\lambda < -n$, Jacobi polynomials $P_n^{(a,\beta)}(x)$ for $a < -n$, $\beta < -n$, $a + \beta < -2(n + 1)$, orthonormal Al-Salam-Carlitz II polynomials $P_n^{(a)}(x; q)$ for $a < 0$, $0 < q < 1$, and q -Laguerre polynomials $L_n^{(a)}(x; q)$ for $a < -n$, $0 < q < 1$ are studied. Several inequalities regarding the real and imaginary properties of these zeros are given, which help locating their position. Moreover, a few limit relations regarding the asymptotic behavior of these zeros are proved. The method used is a functional analytic one. The obtained results complement and improve previously known results.