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A Conjecture on Exceptional Orthogonal Polynomials

Exceptional orthogonal polynomials (so named because they span a non-standard polynomial flag) are defined as polynomial eigenfunctions of Sturm-Liouville problems. By allowing for the possibility that the resulting sequence of polynomial degrees admits a number of gaps, we extend the classical families of Hermite, Laguerre and Jacobi. In recent years the role of the Darboux (or the factorization) transformation has been recognized as essential in the theory of orthogonal polynomials spanning a non-standard flag. In this talk we present the conjecture that ALL such polynomial systems are derived as multi-step factorizations of classical operators and offer some supporting evidence.