Second-order recurrence relation for the linearization coefficients of the classical orthogonal polynomials

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Abstract

Let $\{P_k\}$ be any sequence of the classical orthogonal polynomials. We give explicitly (in terms of the polynomial coefficients of the Pearson equation satisfied by the weight) a second-order recurrence relation (in k) for the coefficients in

$$P_iP_j = \sum_{k=|i-j|}^{i+j} c(i,j,k)P_k.$$

This result is obtained by a method which is alternative to the one proposed recently by A. Ronveaux, Hounkonnou and Belmehdi (see *J. Phys. A: Math. Gen.*). Applications of the result to some named systems of classical orthogonal polynomials are given.