Linearization of product of orthogonal polynomials of a discrete variable

S. Belmehdi, S. Lewanowicz and A. Ronveaux

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Abstract

Let $\{P_k\}$ be any sequence of the classical orthogonal polynomials of a discrete variable. We give explicitly a recurrence relation (in k) for the coefficients in

$$P_i P_j = \sum_k c(i,j,k) P_k,$$

in terms of the coefficients σ and τ of the Pearson equation satisfied by the weight function ϱ, and the coefficients of the three-term recurrence relation and of two structure relations obeyed by $\{P_k\}$.