Foupouagnigni, M.; **Koepf, W.**; **Tcheutia, D.D.**

Connection and linearization coefficients of the Askey-Wilson polynomials. (English)

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The authors use an algorithmic approach to derive in a more general setting than previously considered the connection and linearization coefficients $C_m(n)$ and $L_r(m,n)$ for the Askey-Wilson orthogonal polynomials, i.e.,

$$p_n(x;a,b,c,d|q)=\sum_{m=0}^{n} C_m(n)p_m(x;\alpha,\beta,\gamma,\delta|q),$$

$$p_n(x;a_1,b_1,c_1,d_1|q)p_m(x;a_2,b_2,c_2,d_2|q)=\sum_{r=0}^{n+m} L_r(m,n)p_r(x;\alpha,\beta,\gamma,\delta|q),$$

where the polynomials $p_n(x;a,b,c,d|q)$ with $x=x(s)=\cos\theta=\frac{q^s+q^{-s}}{2}, q=e^{i\theta}$ are expressed through the q-hypergeometric function ${}_r\phi_s$ and the Pochhammer symbol $(a_1,a_2,\dots,a_k;q)_n$.

Reviewers remark: It has to be noted that, through taking the appropriate limits and the use of a specialization process, one can obtain from the corresponding Askey-Wilson formulas the connection and linearization formulas for the orthogonal polynomials of the Askey and q-Askey scheme. The former formulas can be derived directly using the algorithm developed in the article.

Reviewer: Vladimir L. Makarov (Kyïv)

MSC:

33-04 Machine computation, programs (special functions)
33C45 Orthogonal polynomials and functions of hypergeometric type
42C05 General theory of orthogonal functions and polynomials

Keywords:

Askey-Wilson polynomials; q-hypergeometric representation; connection coefficients; linearization coefficients; non-uniform lattices; classical orthogonal polynomials; continuous q-Hahn polynomials; q-Racah polynomials

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