Convolution identities arising from the Lie superalgebra $\mathfrak{osp}(1|2)$

04.05   **Erik Koelink**
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Abstract: There is a link between various sets of orthogonal polynomials and the representation theory of the Lie superalgebra $\mathfrak{osp}(1|2)$. We consider the irreducible unitary representations of $\mathfrak{osp}(1|2)$ which are the analogues of discrete series representations, for which explicit tensor product decompositions exist. By diagonalising an explicit operator of $\mathfrak{osp}(1|2)$ in the representations and in the two- and three-fold tensor products we get eigenfunctions of this operator in different ways; the coupled and the uncoupled way. The relations between these eigenvectors leads to the convolution identities, which can also be viewed as an identity for orthogonal polynomials in two variables. The polynomials involved are Bannai–Ito polynomials and super extensions of the Jacobi, Hahn and generalised Hermite polynomials. Using explicit realisations of the representation, we find a bilinear generating function involving Bessel functions.

This is based on joint work with Jean-Michel Lemay and Luc Vinet, both at CRM, U. de Montréal, Canada.