

THE ROTATION GROUP, BIVARIATE KRAWTCHOUK POLYNOMIALS AND STATE
TRANSFER ON A 2-D LATTICE

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Abstract

I shall explain how polynomials in two discrete variables that are orthogonal with respect to the trinomial distribution arise as matrix elements of the reducible representation of the rotation group $SO(3)$ on the space of the state vectors of the 3-d harmonic oscillator with fixed energy. This algebraic interpretation of the bivariate Krawtchouk polynomials allows as I shall illustrate, for a straightforward characterization of these functions. As an example of their applications, I shall review their use in the design of a spin lattice with remarkable state transfer properties.

Based on work with V. Genest (Montreal), H. Miki (Kyoto) and A. Zhedanov (Donetsk).