Matrix valued multivariable orthogonal polynomials with BC_2-symmetry

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The relation between multivariable special functions and orthogonal polynomials has been influenced greatly by generalising spherical functions on Riemannian symmetric spaces by Heckman and Opdam. These functions and polynomials turn out to be important in mathematical physics. In recent years several approaches to vector and matrix valued analogues in the rank one case have been studied from the perspective of matrix valued spherical functions, and several extensions have been studied. We discuss a rank two case with BC_2-symmetry in detail, and we derive explicit results for the corresponding matrix valued orthogonal polynomials. In particular, the matrix weight function is given explicitly in terms of Krawtchouk polynomials, and we prsent the matrix valued linear partial differential operator for which the polynomials are eigenfunctions.