

MATRIX VALUED ORTHOGONAL POLYNOMIALS AND DARBOUX FACTORIZATIONS

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Matrix valued orthogonal polynomials (MVOPs) which are eigenfunctions of a second order differential operator have been studied recently. This has led to the extension of numerous results of the classical scalar theory. In particular, the so called matrix Bochner problem, solved by Casper and Yakimov, gives a classification of the families with this property. However, the explicit construction of families of arbitrary size is still a difficult problem.

In this talk, we will discuss Darboux factorizations of second order differential operators associated to a family of MVOPs. We will show that such a factorization can be used to construct new families. In the simplest case, this construction leads to lowering and rising shift operators for matrix valued orthogonal polynomials. More general factorizations lead to matrix valued analogues of exceptional polynomials. We will discuss the main properties and explicit examples.

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