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Rational inner functions on a square-matrix polyball

Abstract

We establish the existence of a finite-dimensional unitary realization for every matrix-valued rational (bi-)inner function from the Schur–Agler class on a unit square-matrix polyball, a generalization of Knese's result for the unit polydisk. In the scalar-valued case, we characterize the denominators of these functions. We also show that every polynomial with no zeros in the closed domain is such a denominator. One of our tools is the Korányi–Vagi theorem generalizing Rudin's description of rational inner functions to the case of bounded symmetric domains; we provide a short elementary proof of this theorem suitable in our setting. This is a joint work with A. Grinshpan, V. Vinnikov, and H. J. Woerdeman.

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Special Session: Multivariable operator theory. Organized by H. Woerdeman.