

On a solution of the multidimensional truncated matrix-valued moment problem

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In this talk, we will consider the multidimensional truncated $p \times p$ Hermitian matrix-valued moment problem. We will prove a characterisation of truncated $p \times p$ Hermitian matrix-valued multisequence with a minimal positive semidefinite matrix-valued representing measure via the existence of a flat extension, i.e., a rank preserving extension of a multivariate Hankel matrix (built from the given truncated matrix-valued multisequence). Moreover, the support of the representing measure can be computed via the intersecting zeros of the determinants of matrix-valued polynomials which describe the flat extension. We will also use a matricial generalisation of Tchakaloff's theorem together with the above result to prove a characterisation of truncated matrix-valued multisequences which have a representing measure. When $p = 1$, our result recovers the celebrated flat extension theorem of Curto and Fialkow. The bivariate quadratic matrix-valued problem and the bivariate cubic matrix-valued problem are explored in detail.

This talk is based on joint work with Matina Trachana.