Abstract

Bilinear Hankel forms of higher weights on weighted Bergman spaces on the unit ball of $\mathbb{C}^d$ were introduced by Peetre. They form irreducible components in the tensor product of weighted Bergman spaces under the action of the Möbius group. Each Hankel form corresponds to a vector-valued holomorphic function, called the symbol of the form. In this thesis we characterize bounded, compact and Schatten-von Neumann $\mathcal{S}_p$ $(1 \le p \le \infty)$ Hankel forms in terms of the membership of the symbols in certain Besov spaces. We also present partial results for Hankel forms of higher weights on Hardy spaces.

The study of the Schatten-von Neumann properties is closely related to the boundedness of certain matrix-valued Bergman-type projections onto Hilbert spaces of vector-valued holomorphic functions. We establish some L^p-boundedness criteria for a general class of projections on bounded symmetric domains of type I. We prove also similar results for the orthogonal projections onto Hilbert spaces of nearly holomorphic functions on the unit ball of $\mathbb{C}^d$.

Keywords: Hankel forms, Schatten-von Neumann classes, Bergman spaces, Hardy spaces, Besov spaces, nearly holomorphic functions, Bergman projections, duality of Besov spaces, atomic decomposition, transvectants, unitary representations, Möbius group.

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