ATOMIC DECOMPOSITION OF REAL-VARIABLE TYPE FOR BERGMAN SPACES IN THE UNIT BALL OF $\mathbb{C}^n$

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Abstract: In this paper we show that, for any $0 < p \leq 1$ and $\alpha > -1$, every (weighted) Bergman space $A^p_\alpha(B_n)$ admits an atomic decomposition of real-variable type. More precisely, for each $f \in A^p_\alpha(B_n)$ there exist a sequence of $(p, \infty)_\alpha$-atoms $a_k$ with compact support and a scalar sequence $\{\lambda_k\}$ such that $f = \sum_k \lambda_k a_k$ in the sense of distribution and $\sum_k |\lambda_k|^p \lesssim \|f\|_{p,\alpha}$; and moreover, $f = \sum_k \lambda_k P_\alpha(a_k)$ in $A^p_\alpha(B_n)$, where $P_\alpha$ is the orthogonal projection from $L^2_\alpha(B_n)$ onto $A^2_\alpha(B_n)$. The proof is constructive and our construction is based on analysis inside the unit ball $B_n$ associated with a quasimetric.

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