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HANKEL OPERATORS ON WEIGHTED BERGMAN SPACES ON STRONGLY PSEUDOCONVEX DOMAINS

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Introduction

Let Ω be a C^∞-bounded strongly pseudoconvex domain, $\Omega = \{z \in \mathbf{C}^n: \rho(z) < 0\}$, $n > 1$. For $\nu > -1$, let $dm_\nu = |\rho(z)|^\nu dm$, where dm is the Lebesgue volume form. Let L^2_ν be the L^2-space $L^2(\Omega, dm_\nu)$. We consider the weighted Bergman space $A^{2,\nu}(\Omega)$, the closed subspace of L^2_ν consisting of the holomorphic functions. The orthogonal projection of L^2_ν onto $A^{2,\nu}$ will be denoted by P. Together with P we will consider a non-orthogonal projection $\tilde{P}$ of L^2_ν onto $A^{2,\nu}$, given by an explicit integral kernel $G(z,w)$. Such a kernel, and projection, have been introduced by Kerzman and Stein in [16], and studied by Ligocka in [14] and [15], and by Coupet in [6].

In this paper we consider the Hankel operator, and the so called *non-orthogonal* Hankel operator, denoted by H_f and $\tilde{H}_f$ respectively, and defined by

$$H_f g(z) = (I - P)(\bar{f}g)(z),$$

and

$$\tilde{H}_f g(z) = (I - \tilde{P})(\bar{f}g)(z).$$

The Hankel operators on Bergman spaces are considered to be classical by now. In [1] Axler proved that if f is holomorphic, then the Hankel operator H_f on the unweighted Bergman space $A^2(D)$ on the unit disc D, is bounded (respectively compact) if and only if f is a Bloch function (resp. a little Bloch function). About the same time, in [3] Arazy, Fisher, and Peetre proved the same characterization about boundedness and compactness for H_f in the case of the weighted Bergman spaces on the unit disc for f an analytic symbol. Moreover Arazy, Fisher, and Peetre proved that H_f belongs to the Schatten ideal $\mathscr{S}_p$ if and only if f is in a certain Besov space. These pioneering results have been extended in various directions. In [21] Zhu studied the Hankel operators H_f and $H_{\bar{f}}$ on the unweighted Bergman space

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