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Talk Composition operators on weak vector valued weighted Dirichlet type spaces pp.: 1–4

Composition operators on weak vector valued weighted Dirichlet type spaces

Sepideh Nasresfahani*
University of Tabriz

Hamid Vaezi
University of Tabriz

Abstract

In this article we investigate the composition operator C_ϕ on weak vector valued weighted Dirichlet type spaces $w\mathcal{D}_v^p(X)$ for Banach space X and $1 \leq p \leq 2$. This operator is bounded(compact) on those spaces if the related measure $\mu_{p,v}$ is a (compact) Carleson. Also if C_ϕ is bounded(compact) on $w\mathcal{D}_v^p(X)$, then the same behavior holds on $w\mathcal{D}_v^q(X)$ for $1 \leq q < p$.

Keywords: Composition operator, Carleson measure, Compact Carleson measure, Weak vector valued weighted Dirichlet type space.
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1 Introduction

Let X be a complex Banach space and $\mathbb{D}$ be the open unit disc in the complex plane $\mathbb{C}$. The Lebesgue area measure on $\mathbb{D}$ is defined by $dA(z) = rdrd\theta = dxdy$. Denote by $H(X)$ the class of all analytic functions $f : \mathbb{D} \to X$. The weight function v is a positive function $v(r), 0 \leq r < 1$, which is integrable in $(0, 1)$. We extend v to $\mathbb{D}$ by setting $v(z) = v(|z|), z \in \mathbb{D}$.

For $p \geq 1$, the vector valued weighted Bergman space $A_v^p(X)$ consists of all functions $f \in H(X)$ for which

$$||f||^2_{A_v^p(X)} = \int_{\mathbb{D}} ||f(z)||_X^p v(z)dA(z) < \infty.$$

For $X = \mathbb{C}$ and $v = 1$, the space A^2 is called the (unweighted) Bergman space. Also for $X = \mathbb{C}$ and $v = (1-|z|^2)^\alpha, \alpha > -1$, we have the standard weighted Bergman space $A_\alpha^p(\mathbb{D})$. Note that $A_v^p(X)$ is Banach space for $p \geq 1$ and Hilbert space for $p = 2$ (see [5] for the theory of these spaces).

The vector valued weighted Dirichlet type space $\mathcal{D}_v^p(X)$ is the space of all f in $H(X)$ such that $f' \in A_v^p(X)$, equipped with the norm

$$||f||_{\mathcal{D}_v^p(X)} = ||f(0)|| + ||f'||_{A_v^p(X)}.$$

*Speaker