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Composition Operators on Weighted Orlicz Sequence Spaces

Heera Saini Aditi Sharma and Neetu Singh

Abstract. In this paper, we study the boundedness of composition operators between any two weighted Orlicz sequence spaces

Keywords. Composition operators, Boundedness, weighted Orlicz sequence spaces.

1 Introduction

Let $\phi : [0, \infty) \to [0, \infty)$ be a Young function, that is, a nondecreasing continuous convex function for which $\phi(0) = 0$ and $\lim_{x\to\infty} \phi(x) = \infty$. Let (X, Σ, μ) be a σ-finite and purely atomic measure space, that is

$$X = \bigcup_{n=1}^{\infty} A_n,$$

where A_n are atoms with the measure $\mu(A_n) = a_n > 0$ for all $n \in \mathbb{N}$ and $w = \{w_n\}$ be a weight in X i.e positive and summable real valued sequence. Then the *weighted Orlicz sequence space* $l^{\phi}_{w}(\{a_n\})$ is defined as the space of all real sequences $\mathsf{f} = \{\mathsf{f}_n\}_{n=1}^{\infty}$ such that $I_{\phi,w}(\lambda \mathsf{f}, \{a_n\}) < \infty$ for some $\lambda > 0$, where

$$I_{\phi,w}(\mathsf{f}, \{a_n\}) = \sum_{n=1}^{\infty} \phi(|\mathsf{f}_n|) w_n a_n.$$

This space is a Banach space with the norm

$$\|\mathsf{f}\|_{\phi,w,\{a_n\}} = \inf\{\lambda > 0 \mid I_{\phi,w}(\mathsf{f}/\lambda, \{a_n\}) \leq 1\}.$$

Throughout the paper, we assume (X, Σ, μ) to be a σ-finite and purely atomic measure space with atoms $\{A_n\}$ of measure $\mu(A_n) = a_n > 0$ for any $n \in \mathbb{N}$, $\tau : X \to X$ to be a measurable non-singular transformation such that $\tau(X) = X$ and $b_n := \mu(\tau^{-1}(A_n))/\mu(A_n)$.

Composition operators on Orlicz spaces have also been studied in [3], [4], [5],[9] and [17]. The techniques used in this paper essentially depend on the conditions of embedding of one Orlicz space into another (see, [13, Page 48] and [19] for details).

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