On re Generalized Weighted Bergman Spaces

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Abstract

In this paper is generalized the weighted Bergman space $B_{w,\omega}$ and define

$$B_{w^p,\omega}(U) = \{f \in H(U) \mid ||f||^P_{B_{w^p,\omega}} = \int_U w^p(|f(z)|)\omega(z)dm(z) < +\infty\},$$

on the unit disk U, and we study the composition operator C_φ on the $B_{w^p,\omega}$. A counterexample for Lemma 1 in [3]. On Generalized Weighted Bergman Spaces, Complex Variables, 49 (2), 109-124] is provided and a corrected version of the Lemma and corrections on some other results are presented.

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1 Introduction and Preliminaries

In [3], the weighted Bergman space is extended by Stevic and the continuity and compression of the composition operator C_φ is studied on the extended weighted Bergman space. All the theorems proved in the above-mentioned paper are based on Lemma 1 in that paper. This is while the inequality claimed in the lemma, as well as its proof, is incorrect, thus leading to the incorrectness of some other theorems in the paper, such as Theorem 8. The following result, which is Lemma 1 in [3], was proved by Stevic.

Lemma S. *Let w be a modulus function such that $w(|f|)$ is subharmonic for all $f \in B_{w,\omega}$, then*

$$w(|f(z)|) \leq \frac{1}{2G(1-|z|)} \int_U w(|f(\zeta)|)\omega(\zeta)dm(\zeta) \tag{1.1}$$

for all $z \in U$, where $G(r) = \int_0^r \omega(\rho)\rho d\rho$. Unfortunately, Lemma S is not true in general. In this paper, we first re-extend the extended weighted Bergman space $B_{w,\omega}$ to $B_{w^p,\omega}$, and then present and prove Lemma S in a manner similar to [3]. Next, we show that the theorems presented throughout [3] also hold in the extended space $B_{w^p,\omega}$. In other words, it can be said that we study the composition operator C_φ on $B_{w^p,\omega}$.
Let U be the unit disc in the complex plane $\mathbb{C}$, $dm(z) = rdr(d\theta/\pi)$ the normalized Lebesgue area measure on U, and $H(U)$ the space of all analytic functions in U. Further, suppose

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