

Accepted Manuscript

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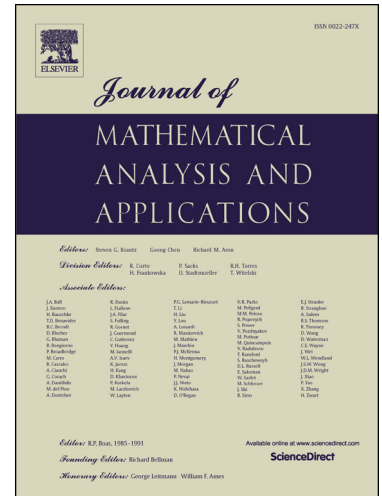
PII: S0022-247X(18)30314-7
DOI: <https://doi.org/10.1016/j.jmaa.2018.04.018>
Reference: YJMAA 22172

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 16 December 2017

Please cite this article in press as: Y. Shi, S. Li, Difference of composition operators between different Hardy spaces, *J. Math. Anal. Appl.* (2018), <https://doi.org/10.1016/j.jmaa.2018.04.018>

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DIFFERENCE OF COMPOSITION OPERATORS BETWEEN DIFFERENT HARDY SPACES

YECHENG SHI AND SONGXIAO LI*

ABSTRACT. Some estimates for the norm and essential norm of the difference of two composition operators between different Hardy spaces are given in this paper.

Keywords: Hardy space, composition operator, difference, norm, essential norm.

1. INTRODUCTION

Let \mathbb{D} denote the open unit disk of the complex plane \mathbb{C} . We denote the closure and the unit circle of \mathbb{D} by $\overline{\mathbb{D}}$ and $\partial\mathbb{D}$, respectively. For $a \in \mathbb{D}$, let $\sigma_a(z) := \frac{a-z}{1-\bar{a}z}$ be the disc automorphism that exchanges 0 for a . Let $\Delta(a, r) := \{z \in \mathbb{D} : |\sigma_a(z)| < r\}$ denote the pseudohyperbolic disk centered at a with radius r . For two points $z, w \in \mathbb{D}$, the pseudohyperbolic distance is given by

$$\rho(z, w) = |\sigma_w(z)| = \left| \frac{z-w}{1-\bar{w}z} \right|.$$

Let $H(\mathbb{D})$ denote the class of functions analytic in \mathbb{D} . Let $dm = \frac{d\theta}{2\pi}$ denote the normalized Lebesgue measure on $\partial\mathbb{D}$. The Lebesgue space $L^p(m)$ will also be denoted by $L^p(\partial\mathbb{D})$, $0 < p < \infty$. For $0 < p < \infty$, let H^p denote the Hardy space of all $f \in H(\mathbb{D})$ such that

$$\|f\|_p^p = \sup_{0 < r < 1} \int_{\partial\mathbb{D}} |f(r\xi)|^p dm(\xi) < \infty.$$

Recall that if $f \in H^p(\mathbb{D})$, then the radial limits $\lim_{r \rightarrow 1} f(re^{i\theta})$ exists almost everywhere on $\partial\mathbb{D}$ and will be denoted also by f , which belongs to $L^p(\partial\mathbb{D})$ and

$$\|f\|_p^p = \frac{1}{2\pi} \int_0^{2\pi} |f(e^{i\theta})|^p d\theta.$$

The space $H^\infty(\mathbb{D})$ consists of all bounded analytic functions on \mathbb{D} , and its norm is given by the supremum norm on \mathbb{D} .

2000 *Mathematics Subject Classification.* 30H10, 47B33.

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