Tokyo J. Math.
Vol. 6, No. 2, 1983

The Factorization of H^p and the Commutators

Yasuo KOMORI

(Communicated by M. Iwano)
Tokyo Metropolitan University

Introduction

In [2] and [8], R. Coifman, R. Rochberg, G. Weiss and A. Uchiyama obtained the factorization theorems for $H^p(R^n)$ by the singular integral operators. Recently S. Chanillo [1] obtained the factorization theorems for $H^1(R^n)$ by the fractional integral operators. In this paper we think about the factorization theorems for $H^p(R^n)$, $p<1$, by the fractional integral operators and we apply the results to the boundedness of certain commutator operators.

I would like to express my gratitude to the referee for his most helpful suggestions and finding some errors.

§1. The definition and the results.

DEFINITION. We say that K is a Calderón-Zygmund kernel if

$$K\not\equiv 0 \ , \quad \int_{S^{n-1}} K(x')dx'=0 \ ,$$

where dx' is the element of "area" of the sphere $|x|=1$,

$$K(rx)=r^{-n}K(x) \quad \text{when} \quad r>0 \quad \text{and} \quad x\neq 0 \ ,$$
$$|K(x)-K(y)|\leqq|x-y| \quad \text{when} \quad |x|=|y|=1 \ ,$$

and define

$$Kf(x)=P.V.\int_{R^n} K(x-y)f(y)dy \ ,$$
$$K'f(x)=P.V.\int_{R^n} K(y-x)f(y)dy \ .$$

Received July 8, 1982
Revised January 13, 1983