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OPERATORS OF VOLTERRA CONVOLUTION TYPE IN GENERALIZED HÖLDER SPACES

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Abstract. Zygmund type estimates are obtained for the mixed continuity modulus of some mixed convolution type integrals. These Zygmund type estimates affect the nature of the improvement of continuity modulus by mixed fractional integrals in Hölder spaces.

1. Introduction

A great number of results are known concerning boundedness of convolution type operators in the Hölder spaces of functions of one variable. In the spaces of continuous functions such as $\widetilde{H}^{\omega}_{0,0}$, the convolution type operators are least investigated. The goal of this paper is to fill a gap to a certain extent in investigations of such kind.

Here, we consider the mixed Volterra convolution type operators

$$(\widetilde{K}\varphi)(x_1,x_2)=\int\limits_a^{x_1}\int\limits_c^{x_2} k(x_1-t)\,k(x_2-s)\,\varphi(t,s)\,dt\,ds,\quad a<x_1,\ c<x_2,$$

in generalized Hölder spaces. We assume that the kernel $k(x_1,x_2)$ is close in a sense to a power.

The result of the type

$$\widetilde{K}:\ \ \widetilde{H}^{\varpi}_0(Q)\to\widetilde{H}^{\varpi_1}_0(Q) \tag{1.1}$$

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