

APPROXIMATION BY KANTOROVICH TYPE (p, q) -BERNSTEIN-SCHURER OPERATORS

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Abstract. In this paper, we introduce a new analogue of Bernstein-Schurer Kantorovich operators based on (p, q) -integers and we call it as (p, q) -Bernstein-Schurer Kantorovich operators. We study approximation properties for these operators based on Korovkin's type approximation theorem and also study some direct theorems.

Keywords. (p, q) -Bernstein-Schurer Kantorovich operators; q -Bernstein-Schurer Kantorovich operator; modulus of continuity; Positive linear operator; Korovkin type approximation theorem.

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1 Introduction

For the last two decades the notion of q -calculus has emerged as a new area in the field of approximation theory. The development of q -calculus has led to the discovery of various modifications of Bernstein polynomials involving q -integers. The aim of these generalizations is to provide appropriate and powerful tools to application areas such as numerical analysis, computer-aided geometric design and solutions of differential equations.

In 1987, Lupaş [16] introduced the first q -analogue of Bernstein operators [5] and investigated its approximating and shape-preserving properties. Another q -generalization of the classical Bernstein polynomials is due to Phillips [24]. Several generalizations of well-known positive linear operators based on q -integers were introduced and their approximation properties have been studied by several authors. For instance, q -Bleimann, Butzer and Hahn operators [4]; q -analogue of Szász-Kantorovich operators [17] and q -analogue of generalized Bernstein-Schurer operators [18] etc..

Dalmanoglu [8] introduced Kantorovich type generalization of q -Bernstein operators and studied some approximation properties of these operators.