Approximation of Modified Baskakov Operators Based on Parameter s

Ali J. Mohammad*, **S. A. Abdul-Hammed, T. A. Abdul-Qader**

Department of Mathematics, College of Education for Pure Sciences, University of Basrah, Basrah, Iraq

Abstract

  In this article, we define and study a family of modified Baskakov type operators based on a parameter $s > -\frac{1}{2}$. This family is a generalization of the classical Baskakov sequence. First, we prove that it converges to the function being approximated. Then, we find a Voronovsky-type formula and obtain that the order of approximation of this family is $O\left(n^{-(2s+1)}\right)$. This order is better than the order of the classical Baskakov sequence $O(n^{-1})$ whenever $s > 0$. Finally, we apply our sequence to approximate two test functions and analyze the numerical results obtained.

Keywords: Baskakov operators, Voronovsky-type asymptotic formula, Order of approximation

تقريب بمؤثرات Baskakov المحدثة المعتمدة على معامل s

علي جاسم محمد*، صفاء عبد الشهيد عبد الحميد، تهاني عبد المجيد عبد القادر

قسم الرياضيات، كلية التربية للعلوم الصرفة، بصرة، العراق

الخلاصه

في هذا البحث، نقدم وندرس عائلة مؤثرات من النمط Baskakov المحدثة المعتمدة على المعامل $s > -1/2$. هذه العائلة تعميم لمتتابعة مؤثرات Baskakov الاعتيادية. أولا، نبرهن تقاربها للدالة المقربة. ثم، نجد نمط صيغة Voronovsky ونجد رتبة تقريب هذه العائلة هو $O\left(n^{-(2s+1)}\right)$. هذه الرتبة أفضل من رتبة تقريب متتابعة Baskakov الاعتيادية $O(n^{-1})$ عندما $s > 0$. أخيرا، نطبق متتابعتنا لتقريب دالتين اختباريتين ونحلل النتائج الحاصلة

1. Introduction

  The well-known classical Baskakov sequence is defined as [1]

$$M_n(f;x) = \sum_{\kappa=0}^{\infty} p_{n,\kappa}(x) f\left(\frac{\kappa}{n}\right), \tag{1.1}$$

where $p_{n,\kappa}(x) = \frac{(n+\kappa-1)!}{\kappa!(n-1)!} x^\kappa (1+x)^{-n-\kappa}, x \in [0,\infty)$.

  Many modifications to the above sequence were applied by several researchers, all reaching the same order of approximation $O(n^{-1})$ [2, 3, 4]. Indeed, there are some techniques, such as the linear combination and Micchelli combination, that were defined and studied for many sequences of positive and linear operators to modify the approximation order by these sequences. But these techniques

---

*Email: alijasmoh@gmail.com