



Generalization of Jakimovski-Leviatan-Păltănea Operators Based on Special Polynomials

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Abstract

In this presentation, a new family of Jakimovski–Leviatan–Păltănea type positive linear operators, generated via a general framework incorporating special polynomials, is introduced and investigated on the unbounded interval $[0, \infty)$. By embedding the exponential moment properties of this general framework, convergence properties are obtained. To form the basis of the theoretical analysis, explicit representations for the moments and central moments are derived using generating function techniques. While uniform convergence properties are established via a Korovkin-type theorem, the rate of convergence is computed with the aid of the modulus of continuity and the Lipschitz class. To better elucidate these convergence characteristics, the theoretical results are supported by structured comparison tables. Furthermore, weighted approximation results are examined in suitable weighted spaces, and a Voronovskaya-type asymptotic theorem is proved to characterize the asymptotic behavior of the approximation error.

Keywords: Jakimovski–Leviatan–Păltănea operators, Korovkin-type theorem, Voronovskaya-type theorem .

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