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Approximation Properties of (q, h)-Generalized Jakimovski-Leviatan Operators

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Abstract

This paper introduces a (q, h)-analogue of the classical Jakimovski–Leviatan operators, thereby unifying the previously studied q- and h-analogues (see [1, 2]). A convergent sequence of these operators is constructed, and their approximation properties are investigated, including error estimates, order of approximation, and a Voronovskaja-type result. In addition, an interesting relation transferring derivatives from the operator to the underlying function is obtained within the framework of (q, h)-calculus. Also, adjoint (q, h)-Bernoulli polynomials are introduced and incorporated into the operators to provide illustrative examples demonstrating the approximation process.

Keywords: (q, h)-Jakimovski-Leviatan operators, positive linear operators, (q, h)-calculus.

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