Dedicated to Professor Yeol Je Cho on the occasion of his retirement

The Dunkl generalization of Stancu type q-Szász-Mirakjan-Kantorovich operators and some approximation results

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ABSTRACT. In this paper, a Dunkl type generalization of Stancu type q-Szász-Mirakjan-Kantorovich positive linear operators of the exponential function is introduced. With the help of well-known Korovkin's theorem, some approximation properties and also the rate of convergence for these operators in terms of the classical and second-order modulus of continuity, Peetre's K-functional and Lipschitz functions are investigated.

References

[1] Acar, T., Aral, A. and Mohiuddine, S. A., *On Kantorovich modification of (p, q)-Baskakov operators*, J. Inequal. Appl., 2016, No. 98, 14 pp.

[2] Acar, T., Agrawal, P. N. and Kumar, A. S., *On a modification of (p, q)-Szász-Mirakyan operators*, Comp. Anal. Op. Theo, **12** (2018), No. 1, 155–167

[3] Acar, T., *Asymptotic formulas for generalized Szász-Mirakyan operators*, Appl. Math. Comput., **263** (2015), 223–239

[4] Acar, T., *Quantitative q-Voronovskaya, q-Grüss-Voronovskaya-type results for q-Szász operators*, Georgian Math. J., **23** (2016), No. 4, 459–468

[5] Bernstein, S. N., *Démonstration du théoréme de Weierstrass fondée sur le calcul des probabilités*, Commun. Soc. Math. Kharkow, (2), **13** (1912-1913), 1–2

[6] Cheikh, B., Gaied, Y. and Zaghouani, M., *A q-Dunkl-classical q-Hermite type polynomials*, Georgian Math. J., **21** (2014), No. 2, 125–137

[7] Gadzhiev, A. D., *Theorems of the type of P. P. Korovkin's theorems (Russian), presented at the international conference on the theory of approximation of functions (Kaluga, 1975)*, Mat. Zametki, **20** (1976), No. 5, 781–786

[8] İçöz, G. and Çekim, B., *Stancu-type generalization of Dunkl analogue of Szász-Kantorovich operators*, Math. Meth. Appl. Sci., **39** (2016), No. 7, 1803–1810

[9] İçöz, G. and Çekim, B., *Dunkl generalization of Szász operators via q-calculus*, Jour. Ineq. Appl., **2015** (2015): 284

[10] Korovkin, P. P., *Convergence of linear positive operators in the spaces of continuous functions (Russian)*, Doklady Akad. Nauk. SSSR (N. S.), **90** (1953), 961–964

[11] Mursaleen, M. and Ansari, K. J., *Approximation of q-Stancu-Beta operators which preserve x^2*, Bull. Malaysian Math. Sci. Soc., **40** (2017), No. 4, 1479–1491

[12] Mursaleen, M. and Khan, A., *Generalized q-Bernstein-Schurer operators and some approximation theorems*, Jour. Function Spaces Appl., **2013** (2013), Article ID 719834, 7 pp.

[13] Mursaleen, M., Khan, F. and Khan, A., *Approximation properties for modified q-Bernstein-kantorovich operators*, Numerical Functional Analysis and Optimization, **36** (2015), No. 9, 1178–1197

[14] Mursaleen M., Khan, F. and Khan, A., *Approximation properties for King's type modified q-Bernstein-Kantorovich operators*, Math. Meth. Appl. Sci., **38** (2015) 5242–5252

[15] Mohiuddine, S. A., Acar, T. and Alotaibi, A., *Construction of a new family of Bernstein-Kantorovich operators*, Math. Meth. Appl. Sci., **40** (2017), 7749–7759

[16] Rosenblum, M., *Generalized Hermite polynomials and the Bose-like oscillator calculus*, Oper. Theory, Adv. Appl., **73** (1994), 369–396

[17] Srivastava, H. M., Mursaleen, M., Alotaibi, A., Nasiruzzaman, Md. and Al-Abied, A. A. H., *Some approximation results involving the q-Szász-Mirakjan-Kantrovich type operators via Dunkl's generalization*, Math. Meth. App. Sci., **40** (2017), No. 15, 5437–5452

[18] Szász, O., *Generalization of S. Bernstein's polynomials to the infinite interval*, J. Res. Natl. Bur. Stand., **45** (1950), 239–245

[19] Sucu, S., *Dunkl analogue of Szász operators*, Appl. Math. Comput., **244** (2014), 42–48

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