SOME NEW (H_p, L_p) TYPE INEQUALITIES OF MAXIMAL OPERATORS OF VILENKIN–NÖRLUND MEANS WITH NON–DECREASING COEFFICIENTS

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Abstract. In this paper we prove and discuss some new (H_p, L_p) type inequalities of maximal operators of Vilenkin-Nörlund means with non-decreasing coefficients. We also apply these inequalities to prove strong convergence theorems of such Vilenkin-Nörlund means. These inequalities are the best possible in a special sense. As applications, both some well-known and new results are pointed out.

REFERENCES

[1] G. N. AGAEV, N. YA. VILENKIN, G. M. DZHAFARLY AND A. I. RUBINSHTEIN, *Multiplicative systems of functions and harmonic analysis on zero-dimensional groups*, Baku, Ehim, 1981 (in Russian).

[2] I. BLAHOTA, *On a norm inequality with respect to Vilenkin-like systems*, Acta Math. Hungar., **89**, 1–2, (2000), 15–27.

[3] I. BLAHOTA AND G. TEPHNADZE, *Strong convergence theorem for Vilenkin-Fejér means*, Publ. Math. Debrecen, **85**, 1–2, (2014), 181–196.

[4] G. GÁT, *Investigations of certain operators with respect to the Vilenkin system*, Acta Math. Hung., **61** (1993), 131–149.

[5] G. GÁT, *Cesàro means of integrable functions with respect to unbounded Vilenkin systems*, J. Approx. Theory **124** (2003), no. 1, 25–43.

[6] U. GOGINAVA, *The maximal operator of Marcinkiewicz-Fejér means of the d-dimensional Walsh-Fourier series*, (English summary) East J. Approx., **12** (2006), no. 3, 295–302.

[7] U. GOGINAVA, *Maximal operators of Fejér-Walsh means*, Acta Sci. Math. (Szeged) **74** (2008), 615–624.

[8] U. GOGINAVA AND K. NAGY, *On the maximal operator of Walsh-Kaczmarz-Fejer means*, Czechoslovak Math. J., **61**, (3), (2011), 673–686.

[9] N. FUJII, *A maximal inequality for H^1-functions on a generalized Walsh-Paley group*, Proc. Amer. Math. Soc. **77** (1979), no. 1, 111–116.

[10] A. KUFNER AND L.-E. PERSSON, *Weighted Inequalities of Hardy Type*, World Scientific Publishing Co., Inc., Singapore, 2003.

[11] A. MESKHI, V. KOKILASHVILI AND L.-E. PERSSON, *Weighted Norm Inequaities with general kernels*, J. Math. Inequal. **12** (3) (2009), 473–485.

[12] C. N. MOORE, *Summable series and convergence factors*, Dover Publications, Inc., New York 1966.

[13] F. MÓRICZ AND A. SIDDIQI, *Approximation by Nörlund means of Walsh-Fourier series*, (English summary) J. Approx. Theory, 70 (1992), no. 3, 375–389.

[14] K. NAGY, *Approximation by Nörlund means of Walsh-Kaczmarz-Fourier series*, Georgian Math. J. **18** (2011), no. 1, 147–162.

[15] K. NAGY, *Approximation by Nörlund means of quadratical partial sums of double Walsh-Fourier series*, Anal. Math., **36** (2010), no. 4, 299–319.

[16] K. NAGY, *Approximation by Nörlund means of double Walsh-Fourier series for Lipschitz functions*, Math. Inequal. Appl., **15** (2012), no. 2, 301–322.

[17] J. PÁL AND P. SIMON, *On a generalization of the concept of derivative*, Acta Math. Acad. Sci. Hungar, **29** (1977), no. 1–2, 155–164.

[18] L. E. PERSSON, G. TEPHNADZE AND P. WALL, *Maximal operators of Vilenkin-Nörlund means*, J. Fourier Anal. Appl., **21**, 1 (2015), 76–94.

[19] F. SCHIPP, F. *Certain rearrangements of series in the Walsh system*, (Russian) Mat. Zametki, **18** (1975), no. 2, 193–201.

[20] P. SIMON, *Cesáro summability with respect to two-parameter Walsh systems*, Monatsh. Math., **131** (2000), no. 4, 321–334.

[21] P. SIMON, *Investigations with respect to the Vilenkin system*, Ann. Univ. Sci. Budapest. Eotvos Sect. Math. **27** (1984), 87–101 (1985).

[22] P. SIMON, *Strong convergence theorem for Vilenkin-Fourier series*, J. Math. Anal. Appl., **245**, (2000), 52–68.

[23] G. TEPHNADZE, *Fejér means of Vilenkin-Fourier series*, Studia Sci. Math. Hungar., **49** (2012), no. 1, 79–90.

[24] G. TEPHNADZE, *On the maximal operators of Vilenkin-Fejér means*, Turkish J. Math., **37** (2013), no. 2, 308–318.

[25] G. TEPHNADZE, *On the maximal operators of Vilenkin-Fejér means on Hardy spaces*, Math. Inequal. Appl., **16**, (2013), no. 2, 301–312.

[26] G. TEPHNADZE, *On the maximal operators of Walsh-Kaczmarz-Fejér means*, Periodica Mathematica Hungarica, **67**, (1), 2013, 33–45.

[27] G. TEPHNADZE, *On the partial sums of Vilenkin-Fourier series*, J. Contemp. Math. Anal., **49** (2014) 1, 23–32.

[28] G. TEPHNADZE, *Strong convergence theorems of Walsh-Fejér means*, Acta Math. Hungar, **142** (1) (2014), 244–259.

[29] N. YA. VILENKIN, *On a class of complete orthonormal systems*, Amer. Math. Soc. Transl., (2) **28** 1963 1–35.

[30] F. WEISZ, *Martingale Hardy spaces and their applications in Fourier analysis*, Lecture Notes in Mathematics, 1568, Springer-Verlag, Berlin, 1994.

[31] F. WEISZ, *Cesáro summability of one and two-dimensional Fourier series*, Anal. math. Studies, **5** (1996), 353–367.

[32] F. WEISZ, *Hardy spaces and Cesáro means of two-dimensional Fourier series*, Approx. theory and function series, (Budapest, 1995), 353–367.

[33] F. WEISZ, *Q-summability of Fourier series*, Acta Math. Hungar., **103** (2004), no. 1–2, 139–175.

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