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CONDITIONS OF ABSOLUTE CESARO SUMMABILITY OF MULTIPLE TRIGONOMETRIC FOURIER SERIES

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A necessary and sufficient condition of absolute $|C;\overline{\beta}|_\lambda$-summability almost everywhere on $\mathbb{T}^s$ is obtained for multiple trigonometric Fourier series of functions $f \in L_{\overline{q}}(\mathbb{T}^s)$ from generalized Besov classes $B^{\omega_r}_{\overline{q},s,\theta}$, where $\mathbb{T}^s = [0,2\pi)^s$, $\overline{\beta} = (\beta_1, \beta_2, \ldots, \beta_s)$, $\overline{q} = (q_1, q_2, \ldots, q_s)$, $1 < q_j \le 2$, $j = \overline{1,s}$, $1 \le \lambda \le q_s \le \ldots \le q_1$, $\lambda < \theta < \infty$, $0 \le \beta_j < 1/q'_j = 1 - 1/q_j$, $j = \overline{1,s}$, $r \in \mathbb{N}$, $r > \sum_{j=1}^{s}(1/q_j - \beta_j)$, and ω_r is a function of the type of modulus of smoothness of order r.

Keywords: multiple trigonometric Fourier series, absolute summability, modulus of smoothness, generalized Besov class.

REFERENCES

1. Timan A.F. *Theory of approximation of functions of real variables.* Macmillan, Pergamon Press, 1963. 631 p. Original Russian text published in Timan A.F. *Teorija priblizhenija funkcij dejstvitel'nogo peremennogo.* Moscow: Fizmatgiz Publ., 1960, 624 p.
2. Timan M.F. Absolute convergence and summability of Fourier series. *Soobshch. Akad. Nauk Gruzin. SSR*, 1961, vol. 26, no. 6, pp. 641–646 (in Russian).
3. Ponomarenko Yu.A. Criteria for absolute Cesaro summability of multiple Fourier series. *Dokl. Akad. Nauk SSSR*, 1963, vol. 152, no. 6, pp. 1305–1307 (in Russian) .
4. Ponomarenko Yu.A., Timan M.F. On the absolute summability of Fourier multiple series. *Ukr. Math. J.*, 1971, vol. 23, no. 3, pp. 291–304. doi: 10.1007/BF01085351 .
5. Szalay I. Absolute summability of trigonometric series. *Math. Notes*, 1981, vol. 30, no. 6, pp. 912–919. doi: 10.1007/BF01145770 .
6. Timan M.F., Ponomarenko Yu.A. Some criteria of absolute summability of Fourier series. In: *Issled. Sovrem. Probl. Konstr. Teor. Funkts.*, sbornik trudov, Baku: AN Azerb. SSR, 1965, pp. 489–492 (in Russian).
7. Gol'dman M.L. On the inclusion of generalized Hölder classes. *Math. Notes*, 1972, vol. 12, no. 3, pp. 626–631. doi: 10.1007/BF01093999 .
8. Akishev G.A., Bitimkhanuly S. Moduli of smoothness and the absolute summability of multiple trigonometric series. *Mat. Zh. Almaty*, 2003, vol. 3, no. 1, pp. 5–14 (in Russian).
9. Bitimkhan S., Akishev G. The conditions of absolute summability of multiple trigonometric series. *AIP Conf. Proc.*, 2015, vol. 1676, no. 1, 020095. doi: 10.1063/1.4930521 .
10. Ul'yanov P.L. Absolute and uniform convergence of Fourier series. *Math. USSR-Sb.*, 1967, vol. 1, no. 2, pp. 169–197. doi: 10.1070/SM1967v001n02ABEH001973 .
11. Bitimkhanuly S. Condition for the absolute summability of multiple trigonometric series. *Vestnik Kazakh. Univ. Ser. Mat., Mekh., Inf.*, 2001, no. 1 (24), pp. 3–11 (in Russian).

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