UDC 517.984

Equiconvergence Theorem for Integral Operator with Involution

E. V. Nazarova[1], **V. A. Khalova**[2]

[1]Ekaterina V. Nazarova, ORCID: 0000-0003-1903-4799, Moscow Bank College of the Central Bank of the Russian Federation, 23, Signalny Pr., Moscow, Russia, 127273, nazarovi@inbox.ru
[2]Victoriya A. Khalova, ORCID: 0000-0003-2148-4932, Saratov State University, 83, Astrakhanskaya Str., Saratov, Russia, 410012, HalovaVA@info.sgu.ru

In the paper, the integral operator with kernel having discontinuities of the first kind at the lines $t = x$ and $t = 1 - x$ is studied. The equiconvergence of Fourier expansions for arbitrary integrable function $f(x)$ in eigenfunctions and associated functions of the considered operator and expansions of linear combination of functions $f(x)$ and $f(1 - x)$ in trigonometric system is proved. The equiconvergence is studied using the method based on integration of the resolvent using spectral value. Methods, developed by A. P. Khromov in the study of spectral theory of integral operators are widely used. Recently, these methods are of use in studies of boundary value problems of mathematical physics using Fourier method with minimal smoothness conditions for the initial data.

Key words: equiconvergence theorem, integral operator, resolvent, eigenfunctions, involution.

DOI: 10.18500/1816-9791-2017-17-3-313-330

References

1. Khromov A. P. Finite-dimensional perturbations of Volterra operators. *Journal of Mathematical Sciences*, 2006, vol. 138, no. 5, pp. 5893–6066. DOI: 10.1007/s10958-006-0346-9.
2. Khromov A. P. An equiconvergence theorem for an integral operator with a variable upper limit of integration. *Metric theory of functions and related problems in analysis*, Moscow, Izd-vo Nauchno-Issled. Aktuarno-Finans. Tsentra (AFTs), 1999, pp. 255–266 (in Russian).
3. Nazarova E. V. *Teoremy ravnoskhodimosti dlia integral'nykh operatorov* [Equiconvergence theorems for integral operators]. Saratov, Publ. house SVIBKhB, 2007. 117 p. (in Russian).
4. Khalova V. A. On analogue of Jordan-Dirichlet theorem about the convergence of the expansions in eigenfunctions of a certain class of differential-difference operators. *Izv. Saratov Univ. (N.S.), Ser. Math. Mech. Inform.*, 2010, vol. 10, iss. 3, pp. 26–32 (in Russian).
5. Khromov A. P., Lukomskii S. F., Sidorov S. P., Terekhin P. A. *Novye metody approksimatsii v zadachakh deistvitel'nogo analiza i v spektral'noi teorii* [New methods of approximation in problems of real analysis and in spectral theory]. Saratov, Saratov Univ. Press, 2015. 204 p. (in Russian).
6. Khromov A. P. Mixed problem for the wave equation with arbitrary two-point boundary conditions. *Doklady Math.*, 2015, vol. 91, no. 3, pp. 294–296. DOI: 10.1134/S1064562415030084.
7. Kornev V. V., Khromov A. P. Equiconvergence of expansions in eigenfunctions of integral operators with kernels that can have discontinuities on the diagonals. *Sb. Math.*, 2001, vol. 192, no. 10, pp. 1451–1469. DOI: 10.1070/SM2001v192n10ABEH000601.

8. Naimark M. A. *Lineinye differentsial'nye operatory* [Linear differential operators]. Moscow, Nauka, 1969. 526 p. (in Russian).
9. Nazarova E. V. *Equiconvergence theorems for integral operators with kernels that are discontinuous on diagonals* : Dis. Cand. Phys.-Math. of Sci. Saratov, 2003. 115 p. (in Russian).
10. Khromov A. P. Equiconvergence theorems for integrodifferential and integral operators. *Math. USSR-Sb.*, 1982, vol. 42, no. 3, pp. 331–355. DOI: 10.1070/SM1982v042n03ABEH002257.

Cite this article as:
Nazarova E. V., Khalova V. A. Equiconvergence Theorem for Integral Operator with Involution. *Izv. Saratov Univ. (N. S.), Ser. Math. Mech. Inform.*, 2017, vol. 17, iss. 3, pp. 313–330 (in Russian). DOI: 10.18500/1816-9791-2017-17-3-313-330.