

## PROPERTIES OF THE SYMBOL OF MULTIDIMENSIONAL SINGULAR INTEGRALS IN THE WEIGHTED SPACES AND OSCILLATING MULTIPLIERS

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*Abstract.* Differential properties of symbols of multidimensional singular integrals in the weighted space of Bessel potentials on the sphere with the weighted functions, having singularities on a sphere are studied. The main results are applied to obtaining theorems on Fourier multipliers of spherical harmonic expansions.

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### REFERENCES

- [1] S. G. MIKHLIN, *Multidimensional singular integrals and integral equations*, Fizmatgiz, Moscow, 1962, English transl., Pergamon Press, 1965.
- [2] ELIAS M. STEIN, *Singular integral operators and differentiability properties of functions*, Princeton Univ. Press, Princeton, State N.J., 1970.
- [3] S. G. MIKHLIN, S. PRESSDORF, *Singular integral operators*, Springer Verlag, Berlin Heidelberg, New York-Tokyo, 1986.
- [4] S. G. SAMKO, *Singular integral on the sphere and the construction characteristics by symbol*, Izv. VUZ ov Mathematics, No. 4 (251) (1983), 28–42. (Russian)
- [5] A. D. GADJIEV, *Exact theorems on multipliers of spherical expansions and some applications*, in “Special problems of function theory”, issue 4, Baku, Elm, 1989, 73–100. (Russian)
- [6] A. D. GADJIEV, *Multipliers of Fourier Series in spherical functions and properties of the symbol of the multidimensional singular operators*, Dokl. Akad. Nauk USSR, **266**, 2 (1982); English transl. Soviet Math. Dokl. **26**, 2 (1982).
- [7] A. D. GADZIEV, *On a connection between the properties of the symbol and the characteristic of a multidimensional singular integral operator in  $L_p$ -spaces*, Dokl. Akad. Nauk USSR **250** (1980), 531–534. English transl. in Soviet Math. Dokl. **21** (1980).
- [8] A. D. GADZIEV, *On differentiability properties of the symbol of a multidimensional singular integral operator*, Matem. Sbornik **114(156)**, 4 (198); English transl. Math. USSR Sbornik **42**, 4 (1982), 427–450.
- [9] F. G. MAKHUDOV, A. D. GADJIEV, *Spherical convolutions and oscillating multipliers*, Baku, Elm, 2000, 1–159. (Russian)
- [10] YU. N. SKIBA, *Instability of the Rossby – Haurwitz wave in the invariant sets of perturbations*, J. Math. Anal. Appl. **290** (2004), 686–701.
- [11] YU. N. SKIBA, *On the spectral problem in the linear stability study of flows on a sphere*, J. Math. Anal. Appl. **270** (2002), 165–180.
- [12] BORIS RUBIN, *Inversion and characterization of the hemispherical transform*, J. D’Anal. Math. **77** (1999), 105–128.
- [13] BORIS RUBIN, *Notes on Radon Transforms in integral geometry*, Fract. Calc. Appl. Anal. **6**, 1 (2003), 25–72.
- [14] KH. P. RUSTAMOV, *On the smoothness of the symbol of multidimensional singular integral operators*, Analysis Math. **13** (1987), 93–199.

- [15] V. S. KRYUCHKOV, *Study of differential properties of symbol of Calderon – Zygmund singular integral*, PhD Dissertation, Moscow, 1983 (Russian).
- [16] B. G. VAKULOV, *Spherical operators of potential type in generalized Holder spaces on the sphere*, PhD Dissertation, Rostov on Don, 1986 (Russian).
- [17] P. M. PAVLOV, *Spherical hypersingular integrals and its applications*, PhD Dissertation, Rostov on Don, 1987 (Russian).
- [18] ROBERT S. STRICHARTZ, *Convolution with kernels having singularities on a sphere*, Trans. American Math. Soc. **148** (1970), 461–471.
- [19] V. S. KRYUCHKOV, *Differential properties of the symbol of a Calderon–Zygmund singular integral operator*, Proc. of the Steklov Inst. of Math. **170**, 1 (1987), 169–183 (Russian).