Journal of Mathematical Inequalities
Volume 8, Number 4 (2014), 791–801
doi:10.7153/jmi-08-60

MARCINKIEWICZ INTEGRALS ASSOCIATED WITH SCHRÖDINGER OPERATOR ON GENERALIZED MORREY SPACES

ALI AKBULUT AND OKAN KUZU

Abstract. Let $L=-\Delta+V$ be a Schrödinger operator, where Δ is the Laplacian on $\mathbb{R}^n$, while nonnegative potential V belongs to the reverse Hölder class. In this paper, we study the boundedness of the Marcinkiewicz operator associated with Schrödinger operator μ_j^L on generalized Morrey spaces $M_{p,\varphi}$. We find the sufficient conditions on the pair (φ_1,φ_2) which ensures the boundedness of the operators μ_j^L from one generalized Morrey space M_{p,φ_1} to another M_{p,φ_2}, $1<p<\infty$ and from the space M_{1,φ_1} to the weak space WM_{1,φ_2}.

Mathematics subject classification (2010): 42B20, 42B35.
Keywords and phrases: Marcinkiewicz operator, Schrödinger operator, generalized Morrey space.

REFERENCES

[1] A. AKBULUT, V. S. GULIYEV AND R. MUSTAFAYEV, *On the boundedness of the maximal operator and singular integral operators in generalized Morrey spaces*, Math. Bohem. **137** (1) (2012), 27–43.
[2] A. AL-SALMAN, H. AL-QASSEM, L. C. CHENG, Y. PAN, *L_p bounds for the function of Marcinkiewicz*, Math. Res. Lett. **9** (2002) 697–700.
[3] A. BENEDEK, A. P. CALDERON, R. PANZONE, *Convolution operators on Banach value functions*, Proc. Natl. Acad. Sci. USA **48** (1962), 256–265.
[4] V. I. BURENKOV, A. GOGATISHVILI, V. S. GULIYEV, R. CH. MUSTAFAYEV, *Boundedness of the Riesz potential in local Morrey-type spaces*, Potential Analysis, **35** (2011), no. 1, 67–87.
[5] G. DI FAZIO, M. A. RAGUSA, *Interior estimates in Morrey spaces for strong solutions to nondivergence form equations with discontinuous coefficients*, J. Funct. Anal. **112** (1993) 241–256.
[6] D. FAN, S. LU AND D. YANG, *Boundedness of operators in Morrey spaces on homogeneous spaces and its applications*, Acta Math. Sinica (N. S.) **14** (1998), suppl., 625–634.
[7] Y. DING, D. YANG, Z. ZHOU, *Boundedness of sublinear operators and commutators on $L^{p,\omega}(\mathbb{R}^n)$*, Yokohama Mathematical, **46** (1998), 15–27.
[8] J. DZIUBAŃSKI, J. ZIENKIEWICZ, *Hardy space H^1 associated to Schrödinger operator with potential satisfying reverse Hölder inequality*, Rev. Mat. Iber. **15** (1999), 279–296.
[9] Y. DING, *On Marcinkiewicz integral*, in: Proc. of the Conference "Singular Integrals and Related Topics, III", Osaka, Japan, 2001, pp. 28–38.
[10] W. GAO, L. TANG, *Boundedness for Marcinkiewicz integrals associated with Schrdinger operators*, Indian Academy of Sci., 2012. (to appear).
[11] M. GIAQUINTA, *Multiple integrals in the calculus of variations and nonlinear elliptic systems*, Princeton Univ. Press, Princeton, NJ, 1983.
[12] V. S. GULIYEV, *Integral operators on function spaces on the homogeneous groups and on domains in $\mathbb{R}^n$*, Doctoral dissertation, Moscow, Mat. Inst. Steklov, 1994, 329 pp. (in Russian).
[13] V. S. GULIYEV, *Function spaces, integral operators and two weighted inequalities on homogeneous groups. Some applications*, Baku, Elm. 1999, 332 pp. (Russian).
[14] V. S. GULIYEV, *Boundedness of the maximal, potential and singular operators in the generalized Morrey spaces*, J. Inequal. Appl. 2009, Art. ID 503948, 20 pp.
[15] V. S. GULIYEV, S. S. ALIYEV, T. KARAMAN, *Boundedness of a class of sublinear operators and their commutators on generalized Morrey spaces*, Abstr. Appl. Anal. vol. 2011, Art. ID 356041, 18 pp. doi:10.1155/2011/356041.

Paper JMI-08-60

[16] V. S. GULIYEV, SEYMUR S. ALIYEV, *Boundedness of parametric Marcinkiewicz integral operator and their commutators on generalized Morrey spaces*, Georgian Math. J. **19** (2012), 195–208.
[17] L. HÖRMANDER, *Translation Invariant Operators*, Acta Math., **104** (1960), 93–139.
[18] A. KUFNER, O. JOHN AND S. FUČIK, *Function Spaces*, Noordhoff International Publishing: Leyden, Publishing House Czechoslovak Academy of Sciences: Prague, 1977.
[19] G. LU, S. LU, D. YANG, *Singular integrals and commutators on homogeneous groups*, Analysis Mathematica, **28** (2002) 103–134.
[20] C. B. MORREY, *On the solutions of quasi-linear elliptic partial differential equations*, Trans. Amer. Math. Soc. **43** (1938), 126–166.
[21] Z. SHEN, *L^p estimates for Schrödinger operators with certain potentials*, Ann. Inst. Fourier (Grenoble) **45** (1995) 513–546.
[22] F. SORIA, G. WEISS, *A remark on singular integrals and power weights*, Indiana Univ. Math. J. **43** (1994) 187–204.
[23] E. M. STEIN, *On the functions of Littlewood-Paley, Lusin, and Marcinkiewicz*, Trans. Amer. Math. Soc. **88** (1958), 430–466.
[24] T. WALSH, *On the function of Marcinkiewicz*, Studia Math. **44** (1972) 203–217.