

L^p BOUNDEDNESS FOR MAXIMAL SINGULAR INTEGRALS WITH MIXED HOMOGENEITY ALONG COMPOUNDS CURVES

SHAOYONG HE* AND YAN XU

Abstract. In this paper, we study the maximal truncated singular integral operators with rough kernel along certain compound curves, which contain many classical model examples. We prove the L^p boundedness of such maximal singular integral operators under very weak conditions on the integral kernels both on the unit sphere and the radial direction. The main results essentially improve and extend certain previous results.

Mathematics subject classification (2020): 42B20, 42B25, 47B38.

Keywords and phrases: Singular integral, maximal operator, mixed homogeneity, rough kernel.

REFERENCES

- [1] A. AL-SALMAN, *Maximal functions along surfaces on product domains*, Anal. Math. **34** (2008), no. 3, 163–175.
- [2] A. AL-SALMAN, *A note on parabolic Marcinkiewicz integrals along surfaces*, Proc. A. Razmadze Math. Inst. **154** (2010), 21–36.
- [3] A. AL-SALMAN, *Parabolic Marcinkiewicz integrals along surfaces on product domains*, Acta Math. Sin. (Engl. Ser.) **27** (2011), no. 1, 1–18.
- [4] H. AL-QASSEM, Y. PAN, *L^p boundedness for singular integrals with rough kernels on product domains*, Hokkaido Math. J. **31** (2002), no. 3, 555–613.
- [5] A. P. CALDERÓN, A. ZYGMUND, *On singular integrals*, Amer. J. Math. **78** (1956), 289–309.
- [6] W. C. CONNETT, *Singular integrals near L^1* , Proc. Sympos. Pure Math. **35** (1979), 163–165.
- [7] Y. CHEN, Y. DING, D. FAN, *A parabolic singular integral operator with rough kernel*, J. Aust. Math. Soc. **84** (2008), no. 2, 163–179.
- [8] Y. CHEN, F. WANG, M. YU, *L^p bounds for the parabolic singular integral operator*, J. Inequal. Appl. **2012** (2012), no. 121, 1–9.
- [9] J. DUOANDIKOETXEA, J. L. RUBIO DE FRANCIA, *Maximal and singular integral operators via Fourier transform estimates*, Invent. Math. **84** (1986), no. 3, 541–561.
- [10] E. FABES, N. RIVIÈRE, *Singular integrals with mixed homogeneity*, Studia Math. **27** (1966), 19–38.
- [11] D. FAN, K. GUO, Y. PAN, *A note of a rough singular integral operator*, Math. Inequal. Appl. **1**, 73–81 (1999).
- [12] D. FAN, Y. PAN, *Singular integral operators with rough kernels supported by subvarieties*, Amer. J. Math. **119** (1997), no. 4, 799–839.
- [13] D. FAN, S. SATO, *A note on the singular integrals associated with a variable surface of revolution*, Math. Inequal. Appl. **12** (2009), no. 2, 441–454.
- [14] R. FEFFERMAN, *A note on singular integrals*, Proc. Am. Math. Soc. **74** (1979), no. 2, 266–270.
- [15] L. GRAFAKOS, A. STEFANOV, *L^p bounds for singular integrals and maximal singular integrals with rough kernels*, Indiana Univ. Math. J. **47** (1998), no. 2, 455–469.
- [16] F. LIU, *On singular integrals associated to surfaces*, Tohoku Math. J. (2) **66** (2014), no. 1, 1–14.
- [17] F. LIU, H. WU, *Multiple singular integrals and Marcinkiewicz integrals with mixed homogeneity along surfaces*, J. Inequal. Appl. **2012** (2012), no. 89, 1–23.
- [18] F. LIU, H. WU, *Rough singular integrals and maximal operators with mixed homogeneity along compound curves*, Math. Nachr. **287** (2014), no. 10, 1166–1182.

- [19] A. NAGEL, N. RIVIÈRE, S. WAINGER, *On Hilbert transforms along curves. II*, Amer. J. Math. **98** (1976), no. 2, 395–403.
- [20] J. NAMAZI, *A singular integral*, Proc. Amer. Math. Soc. **96** (1986), no. 3, 421–424.
- [21] J. SHEN, S. HE, J. CHEN, *Multiple parametric Marcinkiewicz integrals with mixed homogeneity along surfaces*, Appl. Math. J. Chinese Univ. Ser. B **38** (2023), no. 3, 413–428.
- [22] T. WALSH, *On the function of Marcinkiewicz*, Studia Math. **44** (1972), 203–217.