

## A GOOD $\lambda$ ESTIMATE FOR MULTILINEAR COMMUTATOR OF FRACTIONAL INTEGRAL ON SPACES OF HOMOGENEOUS TYPE

ZHANG QIAN AND LIU LANZHE

**Abstract.** In this paper, a good  $\lambda$  estimate for the multilinear commutator associated to the fractional integral operator on the spaces of homogeneous type is obtained. Under this result, we get the  $(L^p(X), L^q(X))$ -boundedness of the multilinear commutator.

*Mathematics subject classification (2010):* 42B20, 42B25.

*Keywords and phrases:* Fractional integral, multilinear commutator, Lipschitz space, BMO, space of homogeneous type, good  $\lambda$  inequality.

### REFERENCES

- [1] J. ALVAREZ, R.J. BABGY, D.S. KURTZ AND C. PÉREZ, *Weighted estimates for commutators of linear operators*, Studia Math., **104** (1993), 195–209.
- [2] J. J. BETANCOR, *A commutator theorem for fractional integrals in spaces of homogeneous type*, Inter. J. Math. & Math. Sci., **6**, 24 (2000), 419–421.
- [3] A. BERNARDIS, S. HARTZSTEIN AND G. PRADOLINI, *Weighted inequalities for commutators of fractional integrals on spaces of homogeneous type*, J. Math. Anal. Appl., **322** (2006), 825–846.
- [4] M. BRAMANTI AND M. C. CERUTTI, *Commutators of singular integrals and fractional integrals on homogeneous spaces*, Harmonic Analysis and Operator Theory, Contemp. Math., **189**, Amer. Math. Soc., 1995, 81–94.
- [5] S. CHANILLO, *A note on commutators*, Indiana Univ Math. J., **31** (1982), 7–16.
- [6] W. G. CHEN, *Besov estimates for a class of multilinear singular integrals*, Acta Math. Sinica, **16** (2000), 613–626.
- [7] W. CHEN AND E. SAWYER, *Endpoint estimates for commutators of fractional integrals on spaces of homogeneous type*, J. Math. Anal. Appl., **282** (2003), 553–566.
- [8] J. COHEN AND J. GOSELIN, *A BMO estimate for multilinear singular integral operators*, Illinois J. Math., **30** (1986), 445–465.
- [9] R. COIFMAN, R. ROCHBERG AND G. WEISS, *Factorization theorems for Hardy spaces in several variables*, Ann. of Math., **103** (1976), 611–635.
- [10] J. GARCIA-CUERVA AND J. L. RUBIO DE FRANCIA, *Weighted norm inequalities and related topics*, North-Holland Math., **16**, Amsterdam, 1985.
- [11] I. GENEBAZHVILI, A. GOGATISHVILI, V. KOKILASHVILI AND M. KRBEĆ, *Weighted theory for integral transforms on spaces of homogeneous type*, Piman Monogr. and Surveys in Pure and Appl. Math., **92**, Addison-Wesley/Longman, 1998.
- [12] G. E. HU AND D. C. YANG, *A variant sharp estimate for multilinear singular integral operators*, Studia Math., **141** (2000), 25–42.
- [13] S. JANSON, *Mean oscillation and commutators of singular integral operators*, Ark. Math., **16** (1978), 263–270.
- [14] R. MACÍAS AND C. SEGOVIA, *Lipschitz functions on spaces of homogeneous type*, Adv. Math., **33** (1979), 257–270.
- [15] M. PALUSZYNSKI, *Characterization of the Besov spaces via the commutator operator of Coifman, Rochberg and Weiss*, Indiana Univ. Math. J., **44** (1995), 1–17.
- [16] C. PÉREZ, *Endpoint estimate for commutators of singular integral operators*, J. Func. Anal., **128** (1995), 163–185.

- [17] C. PÉREZ AND G. PRADOLINI, *Sharp weighted endpoint estimates for commutators of singular integral operators*, Michigan Math. J., **49** (2001), 23–37.
- [18] C. PÉREZ AND R. TRUJILLO-GONZALEZ, *Sharp weighted estimates for multilinear commutators*, J. London Math. Soc., **65** (2002), 672–692.
- [19] G. PRADOLINI, O. SALINAS, *Commutators of singular integrals on space of homogeneous type*, preprint, available at <http://math.unl.edu.ar/preprints/>.
- [20] E. M. STEIN, *Harmonic analysis: real variable methods, orthogonality and oscillatory integrals*, Princeton Univ. Press, Princeton NJ, 1993.