

**BOUNDEDNESS FOR MULTILINEAR COMMUTATORS
OF INTEGRAL OPERATORS IN HARDY AND
HERZ-HARDY SPACES ON HOMOGENEOUS SPACES**

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Abstract. In this paper, we shall study the Hardy-boundedness for the multilinear commutators related to the singular integral operators on the space of homogeneous type. By using the Hölder's inequalities and the $L^q(1 < q < \infty)$ boundedness for the singular integral operators on the space of homogeneous type, we obtain the (H_b^p, L^p) and $(HK_{q,b}^{\alpha,p}, K_q^{\alpha,p})$ type boundedness for the multilinear commutators on the space of homogeneous type.

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

Keywords and phrases: Singular integral, multilinear commutator, BMO, Hardy space; Herz-Hardy space, space of homogeneous type.

REFERENCES

- [1] J. ALVAREZ, *Continuity properties for linear commutators of Calderón-Zygmund operators*, Collect. Math., **49** (1998), 17–31.
- [2] J. ALVAREZ, R. J. BABGY, D. S. KURTZ AND C. PÉREZ, *Weighted estimates for commutators of linear operators*, Studia Math., **104** (1993), 195–209.
- [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] J. J. BETANCOR, *A commutator theorem for fractional integrals in spaces of homogeneous type*, Inter. J. Math. & Math. Sci., **6**, 24 (2000), 419–421.
- [5] 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.
- [6] M. BRAMANTI-M. C. CERUTTI, *Commutator of singular integrals on homogeneous spaces*, Boll. Un. Mat. Ital. B (7) **10** (1996), 843–883.
- [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] R. COIFMAN, R. ROCHBERG AND G. WEISS, *Factorization theorem for Hardy space in several variables*, Ann. of Math., **103** (1976), 611–635.
- [9] J. GARCIA-CUERVA AND M. L. HERRERO, *A Theory of Hardy spaces associated to Herz Spaces*, Proc. London Math. Soc., **69** (1994), 605–628.
- [10] I. GENEBAZHVILI, A. GOGATISHVILI, V. KOKILASHVILI AND M. KRBC, *Weighted theory for integral transforms on spaces of homogeneous type*, Piman Monogr. and Surveys in Pure and Appl. Math., 92, Addison-Wesley/Longman, 1998.
- [11] S. Z. LU, *Four lectures on real H^p spaces*, World Scientific, River Edge, NJ, 1995.
- [12] S. Z. LU AND D. C. YANG, *The decomposition of the weighted Herz spaces and its applications*, Sci. in China (ser. A), **38** (1995), 147–158.
- [13] S. Z. LU AND D. C. YANG, *The weighted Herz type Hardy spaces and its applications*, Sci. in China (ser. A), **38** (1995), 662–673.
- [14] C. PÉREZ, *Endpoint estimate for commutators of singular integral operators*, J. Func. Anal., **128** (1995), 163–185.

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