Journal of Mathematical Inequalities
Volume 9, Number 1 (2015), 219–234
doi:10.7153/jmi-09-20

MULTI–WEIGHTED BOUNDEDNESS FOR MULTILINEAR ROUGH FRACTIONAL INTEGRALS AND MAXIMAL OPERATORS

XIANGXING TAO AND YANLONG SHI

Abstract. In this article, several sufficient conditions on the weights $(\vec{v},u)$ are given such that the multilinear rough fractional integrals $I^{(m)}_{\Omega,\alpha}$ and the rough multi-sublinear fractional maximal operators $M^{(m)}_{\Omega,\alpha}$ are bounded from the product spaces $L^{p_1}_{v_1}(\mathbb{R}^n)\times L^{p_2}_{v_2}(\mathbb{R}^n)\times\cdots\times L^{p_m}_{v_m}(\mathbb{R}^n)$ to the space $L^q_u(\mathbb{R}^n)$. The weak multi-weighted boundedness has also been derived. These results will extend the early and recent works in this direction.

Mathematics subject classification (2010): Primary 42B20, 42B25.
Keywords and phrases: Multilinear fractional integral, multi-sublinear fractional maximal function, rough kernel, $\mathscr{A}^{\alpha,r,t}_{\vec{p},q}$ weight.

REFERENCES

[1] S. CHANILLO, D. K. WATSON AND R. L. WHEEDEN, *Some integral and maximal operators related to starlike sets*, Studia Math. **107** (1993), 223–255.
[2] X. CHEN AND Q. XUE, *Weighted estimates for a class of multilinear fractional type operators*, J. Math. Anal. Appl. **362** (2010), 355–373.
[3] Y. DING AND S. Z. LU, *Weighted norm inequalities for fractional integral operators with rough kernel*, Canad. J. Math. **58** (1998), 29–39.
[4] J. GARCÍA-CUERVA AND JOSÉ MARÍA MARTELL, *Two-weight norm inequalities for maximal operator and fractional integrals on non-homogeneous spaces*, Indiana Univ. Math. J. **50** (2001), 1241–1280.
[5] L. GRAFAKOS, *On multilinear fractional integrals*, Studia Math. **102** (1992), 49–56.
[6] L. GRAFAKOS AND R. TORRES, *Multilinear Calderón-Zygmund theory*, Adv. Math. **165** (2002), 124–164.
[7] L. GRAFAKOS AND R. TORRES, *Maximal operator and weighted norm inequalities for multilinear singular integrals*, Indiana Univ. Math. **51** (2002), 1261–1276.
[8] A.K. LERNER, S. OMBROSI, C. PÉREZ, R.H. TORRES, R. TRUJILLO-GONZÁLEZ, *New maximal functions and multiple weights for the multilinear Calderón-Zygmund theory*, Adv. Math. **220** (2009), 1222–1264.
[9] C. E. KENIG AND E. M. STEIN, *Multilinear estimates and fractional integration*, Math. Res. Lett. **6** (1999), 1–15.
[10] K. MOEN, *Weighted inequalities for multilinear fractional integral operators*, Collect. Math. **60** (2009), 213–238.
[11] B. MUCKENHOUPT AND R. L. WHEEDEN, *Weighted norm inequalities for fractional integrals*, Trans. Amer. Math. Soc. **192** (1974), 261–274.
[12] C. PÉREZ, *Two weighted norm inequalities for potential and fraction maximal operators*, Indian Univ. Math. J. **43** (1994), 663–683.
[13] E. SAWYER, R. L. WHEEDEN, *Weighted inequalities for fractional integrals on euclidean and homogeneous spaces*, Amer. J. Math. **114** (1992), 813–874.
[14] Y. L. SHI, X. X. TAO, *Boundedness for multilinear fractional integral operators on Herz type spaces*, Applied Mathematics, A J. Chinese Univ. Ser. B, **23** (2008), 437–446.

Paper JMI-09-20

[15] X. X. TAO, Y. L. SHI AND S. Y. ZHANG, *Boundedness of multilinear Riesz potential on product of Morrey and Herz-Morrey spaces*, Acta Math. Sinica, Chinese Series, **52** (2009), 535–548.