TWO–WEIGHT ENTROPY BOUNDEDNESS OF
MULTILINEAR FRACTIONAL TYPE OPERATORS

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Abstract. This paper will be devoted to study the two-weight norm inequalities of the multilinear fractional maximal operator $\mathcal{M}_\alpha$ and the multilinear fractional integral operator $\mathcal{I}_\alpha$. The entropy conditions in the multilinear setting will be introduced and the entropy bounds for $\mathcal{M}_\alpha$ and $\mathcal{I}_\alpha$ will be given.

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REFERENCES

[1] M. CAO, K. LI, Q. XUE, *A Characterization of two weight norm inequality for Littlewood-Paley g_λ^*-function*, http://arxiv.org/abs/1504.07850.

[2] M. CAO, Q. XUE, *Characterization of two-weighted inequalities for multilinear fractional maximal operator*, Nonlinear Analysis: TMA **130** (2016) 214–228.

[3] M. CAO, Q. XUE, K. YABUTA, *On multilinear fractional strong maximal operator associated with rectangles and multiple weights*, Rev. Mat. Iberoamericana., to appear.

[4] W. CHEN, W. DAMIÁN, *Weighted estimates for the multilinear maximal function*, Rend. Circ. Mat. Palermo. **62** (2013), 379–391.

[5] S. CHEN, H. WU, Q. XUE, *A note on multilinear Muckenhoupt classes for multiple weights*, Studia Math. **223** (1) (2014).

[6] T. HÄNNINEN, T. HYTÖNEN, K. LI, *Two-weight L^p-L^q bounds for positive dyadic operators: Unified approach to $p \leqslant q$ and $p > q$*, Potential Anal., **45** (2016), 579–608.

[7] T. HYTÖNEN, *The two-weight inequality for the Hilbert transform with general measures*, http://arxiv.org/abs/1312.0843v1.

[8] T. HYTÖNEN, *Representation of singular integrals by dyadic operators, and the A_2 theorem*, http://arxiv.org/abs/1108.5119v1.

[9] T. HYTÖNEN AND C. PÉREZ, *Sharp weighted bounds involving A_∞*, Analysis and PDE. **6** (2013), no. 4, 777–818.

[10] M. T. LACEY, *The two weight inequality for the Hilbert transform: a primer*, submitted (2013), http://www.arxiv.org/abs/1304.5004.

[11] M. T. LACEY, *Two weight inequality for the Hilbert transform: a real variable characterization, II*, Duke Math. J. **163** (2014), no. 15, 2821–2840.

[12] M. T. LACEY, K. LI, *Two weight norm inequalities for g function*, Math. Res. Lett. **21** (2014), no. 03, 521–536.

[13] M. T. LACEY, K. LI, *On A_p-A_∞ type estimates for square functions*, Math. Z. **284** (2016), 1211–1222.

[14] M. T. LACEY, E. T. SAWYER, I. URIARTE-TUERO, *Two weight inequalities for discrete positive operators*, http://arxiv.org/abs/0911.3437v4.

[15] M. T. LACEY, E. T. SAWYER, I. URIARTE-TUERO AND C.-Y. SHEN, *Two weight inequality for the Hilbert transform: a real variable characterization, I*, Duke Math. J. **163** (2014), no. 15, 2795–2820.

[16] M. LACEY AND S. SPENCER, *On entropy bumps for Calderón-Zygmund operators*, Concr. Oper. **2015**, 2: 47–52.

[17] K. LI, K. MOEN, W. SUN, *Sharp weighted inequalities for multilinear fractional maximal operator and fractional integrals*, Math. Nachr. **288** (2015), no. 5–6, 619–632.

[18] K. LI, W. SUN, *Characterization of a two weight inequality for multilinear fractional maximal operators*, Houston J. Math. **42** (2016), no. 3, 977–990.

[19] K. LI, W. SUN, *Two weight norm inequalities for the bilinear fractional integrals*, Manuscripta math. **150**, 159–175 (2016).

[20] F. NAZAROV, S. TREIL AND A. VOLBERG, *The Bellman function and two weight inequalities for Haar multipliers*, J. Amer. Math. Soc. **12** (1999), no. 4, 909–928.

[21] R. RAHM, S. SPENCER, *Some entropy bump conditions for fractional maximal and integral operators*, Concr. Oper. **2016**, 3: 112–121.

[22] E. SAWYER, *A characterization of a two weight norm inequality for maximal operators*, Studia Math. **75** (1982), 1–11.

[23] E. SAWYER, *A two weight weak type inequality for fractional integrals*, Trans. Amer. Math. Soc. **281** (1984), 339–345.

[24] E. SAWYER, *A characterization of two weight norm inequalities for fractional and Poisson integrals*, Trans. Amer. Math. Soc. **308** (1988), 533–545.

[25] B. F. SEHBA, *On two-weight norm estimates for multilinear fractional maximal function*, `http://arxiv.org/abs/1502.01612`.

[26] S. TREIL AND A. VOLBERG, *Entropy conditions in two weight inequalities for singular integral operators*, Adv. Math. **301** (2016) 499–548.

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