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SMOOTHING PROPERTIES OF THE DISCRETE FRACTIONAL MAXIMAL OPERATOR ON BESOV AND TRIEBEL–LIZORKIN SPACES

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Abstract: Motivated by the results of Korry, and Kinnunen and Saksman, we study the behaviour of the discrete fractional maximal operator on fractional Hajłasz spaces, Hajłasz–Besov, and Hajłasz–Triebel–Lizorkin spaces on metric measure spaces. We show that the discrete fractional maximal operator maps these spaces to the spaces of the same type with higher smoothness. Our results extend and unify aforementioned results. We present our results in a general setting, but they are new already in the Euclidean case.

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Key words: Besov space, fractional maximal function, fractional Sobolev space, Triebel–Lizorkin space, metric measure space.