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Operators of Harmonic Analysis in Grand Variable Exponent Morrey Spaces

The boundedness of the Hardy–Littlewood maximal, Calderón–Zygmund singular and fractional integral operators in grand variable exponent Morrey spaces under log-Hölder continuity condition on exponents is established. Grand variable exponent Morrey space is a non-standard function space unifying variable and grand Morrey spaces. We study the problem for operators and spaces defined on quasi-metric measure spaces with doubling measure (space of homogeneous type). Sobolev–type inequality for fractional integrals with variable parameters in these spaces defined on quasi-metric measure spaces with non-doubling measure (non-homogeneous space) is also derived. The results are new for maximal, Calderón–Zygmund singular and fractional integral operators, and grand variable exponent Morrey spaces defined, for example, on certain domains in Euclidean spaces, bounded rectifiable curves satisfying the regularity condition, nilpotent Lie groups with Haar measure (homogeneous groups), etc. Some structural properties of grand variable exponent Morrey spaces are also investigated.