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Bessel potentials in Ahlfors regular metric spaces

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Abstract

In this paper we define Bessel potentials in Ahlfors regular spaces using a Coifman type approximation of the identity, and show they improve regularity for Lipschitz, Besov and Sobolev-type functions. We prove density and embedding results for the Sobolev potential spaces defined by them. Finally, via fractional derivatives, we find that for small orders, these Bessel potentials are inversible, and show a way to characterize potential spaces, using singular integrals techniques, such as the $T1$ theorem. Moreover, this characterization allows us to prove these spaces in fact coincide with the classical potential Sobolev spaces in the Euclidean case.