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Sobolev meets Riesz: an alternative characterization of weighted Sobolev spaces via weighted Riesz bounded variation spaces

We introduce weighted Riesz bounded variation spaces defined in an open subset of the n -dimensional Euclidean space. Using the newly introduced space we give a characterization of weighted Sobolev spaces when the weight belongs to the Muckenhoupt class. Some embeddings and weak type estimates are also provided. We also provide, as an application of the main result, a characterization of variable exponent Sobolev spaces via variable exponent Riesz bounded variation spaces.

This is a joint work with Professor David Cruz-Uribe and Professor Humberto Rafeiro.