

Local means and atoms in vector-valued function spaces

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Abstract

The first part of this paper deals with the topic of finding equivalent norms and characterizations for vector-valued Besov and Triebel-Lizorkin spaces $B_{p,q}^s(E)$ and $F_{p,q}^s(E)$. We will deduce general criteria by transferring and extending a theorem of Bui, Paluszyński and Taibleson from the scalar to the vector-valued case.

By using special norms and characterizations we will derive necessary and sufficient conditions for belonging to a vector-valued function spaces $B_{p,q}^s(E)$ or $F_{p,q}^s(E)$. It will be shown that an element of $\mathcal{S}'(\mathbb{R}^n, E)$ belongs to a function space if and only if it can be written as a linear combination of harmonic atoms resp. quarks with suitable conditions for the coefficients.