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New Characterizations of Besov-Triebel-Lizorkin-Hausdorff Spaces including Wavelets via Coorbits

This talk is on new characterizations of the recently introduced Besov-type space $\dot{B}^{s,\tau}_{p,q}(\mathbb{R}^n)$ and Triebel-Lizorkin-type spaces $\dot{F}^{s,\tau}_{p,q}(\mathbb{R}^n)$ with $p \in (0,\infty]$, $s \in \mathbb{R}$, $\tau \in [0,\infty)$, and $q \in (0,\infty]$, as well as their preduals, the Besov-Hausdorff spaces $B\dot{H}^{s,\tau}_{p,q}(\mathbb{R}^n)$ and Triebel-Lizorkin-Hausdorff spaces $F\dot{H}^{s,\tau}_{p,q}(\mathbb{R}^n)$, in terms of the local means, the Peetre maximal function of local means, and the tent space (the Lusin area function) in both discrete and continuous types. As applications, the authors then obtain interpretations as coorbits in the sense of H. Rauhut in (Studia Math. 180 (2007), 237-253) and discretizations via the biorthogonal wavelet bases for the full range of parameters of these function spaces. Even for some special cases of this setting such as $\dot{F}^{s}_{\infty,q}(\mathbb{R}^n)$ for $s \in \mathbb{R}$, $q \in (0,\infty]$ (including $\mathrm{BMO}(\mathbb{R}^n)$ when $s=0$, $q=2$), the Q space $Q_\alpha(\mathbb{R}^n)$, the Hardy-Hausdorff space $HH_{-\alpha}(\mathbb{R}^n)$ for $\alpha \in (0, \min\{\frac{n}{2}, 1\})$, the Morrey space $\mathcal{M}^u_p(\mathbb{R}^n)$ for $1 < p \le u < \infty$, and the Triebel-Lizorkin-Morrey space $\dot{\mathcal{E}}^{s}_{upq}(\mathbb{R}^n)$ for $0 < p \le u < \infty$, $s \in \mathbb{R}$ and $q \in (0,\infty]$, some of these results are new.

This is joint work with Yiyu Liang, Yoshihiro Sawano, Dachun Yang, and Wen Yuan.