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Spaces of generalized smoothness in the critical case: Optimal embeddings, continuity envelopes and approximation numbers

This is a joint work with Júlio S. Neves and Cornelia Schneider. We study necessary and sufficient conditions for embeddings of Besov and Triebel-Lizorkin spaces of generalized smoothness $B_{p,q}^{\sigma,N}(\mathbb{R}^n)$ and $F_{p,q}^{\sigma,N}(\mathbb{R}^n)$, respectively, into generalized Hölder spaces $\Lambda_{\infty,r}^{\mu(\cdot)}(\mathbb{R}^n)$ in a limiting case $\bar{s}(\sigma N^{-n/p}) = 0$. In particular, we characterize optimal embeddings for B-spaces provided $q > 1$ and for F-spaces when $p > 1$. As immediate applications of our results we obtain continuity envelopes and give upper and lower estimates for approximation numbers of related embeddings.