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Optimal approximation of break-of-scale embeddings

As a rule of thumb in approximation theory, the asymptotic speed of convergence of numerical methods is governed by the regularity of the objects we like to approximate. Besides classical isotropic Sobolev smoothness, the notion of dominating mixed regularity of functions turned out to be an important concept in numerical analysis. Although approximation rates of embeddings *within* the scales of isotropic or dominating-mixed L_p-Sobolev spaces are well-understood, not that much is known for embeddings *across* those scales. In this talk we introduce particular instances of new hybrid smoothness spaces which cover both scales as special cases. Moreover, we present (non-)adaptive wavelet-based approximation algorithms that achieve optimal dimension-independent rates of convergence for certain practically important break-of-scale embeddings.

The talk is based on recent joint work [1] with Janina Hübner (RUB) and Glenn Byrenheid (FSU Jena).

References.

[1] G. Byrenheid, J. Hübner, and M. Weimar. Rate-optimal sparse approximation of compact break-of-scale embeddings. Submitted (2022). arXiv:2203.10011