

Comparison of the Multiscale Hierarchical Decomposition Method and generalized Tikhonov regularization

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The Multiscale Hierarchical Decomposition Method (MHDM) is a popular method originating from mathematical imaging. In its original context, it is very well suited to recover approximations with fine details from blurred and noise-corrupted images. The main idea is to iteratively decompose an image into a cartoon and a texture part at different scales. We consider the algorithm in a more general framework, allowing one to apply it to a wider variety of problems. In this talk, we focus on comparing the MHDM to generalized Tikhonov regularization with seminorm regularizers. We propose a necessary and sufficient condition for the iterates of the MHDM to coincide with the minimizers of the Tikhonov regularization. We illustrate the result on finite dimensional ℓ^1 regularization and one-dimensional total variation denoising.

Joint work with Elena Resmerita and Stefan Kindermann.

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