Regularization schemes involving self-similarity in imaging inverse problems

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Abstract. In this talk we introduce and analyze a set of regularization expressions defined based on self-similarity of images to address the classical inverse problem of image denoising and the ill-posed inverse problem of single-frame image zooming.

The regularization expressions introduced are similar to the ones arising in example-based image enhancement techniques, for which examples are taken from the observed image itself. Traditionally, such expressions can be constructed using "*Classical fractal image transform*", or the newly developed "*Nonlocal-means (NL-means) image denoising filter*" *(A. Buades et al., 2005).*

We exploit these regularization terms in a global MAP-based formulation, for which we derive analytical and computational solutions. We analytically compare the solution of such MAP-based approach to the results based on the classical methods (e.g., fractal-based denoising and zooming, and NL-means image denoising).

Furthermore, the related ill-posed inverse problem of *missing fractal codes* will be introduced and addressed using various classical regularization techniques.