Sampsa Pursiainen: *A coarse-to-fine strategy for maximum a posteriori estimation in limited-angle computerized tomography*; Helsinki University of Technology, Institute of Mathematics, Research Reports A489 (2005).

Abstract: *The X-ray tomography problem is to reconstruct a function from its tomographic projections. This paper concerns limited-angle tomography where images are reconstructed from incomplete projection data that are limited in viewing angle and number of radiographs. The limited-angle reconstruction problem is an ill-posed inverse problem. Even if the data are noiseless obtaining an artifact-free reconstruction is problematic without a priori information about the source function. The reconstruction problem is formulated in terms of Bayesian statistics, where all the variables included in the model are defined as random vectors that follow the posterior probability density. In inverse problems, estimation of the properties of the posterior density can be problematic even if the statistical model was simple. This paper introduces a coarse-to-fine strategy, where the maximizing point the mean of a Gaussian posterior density is sought iteratively by projecting the space of possible source images into a subspace of coarser resolution images through wavelet low-pass filtering during the iteration procedure. The maximization problem is written in a preconditioned form in order to obtain better estimates. Numerical results are presented.*

AMS subject classifications: 65N21, 65C50, 65F22, 65F10, 65T60

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