Iteratively Regularized Gauss-Newton Method with Parameter Decomposition

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Abstract

In this talk, we establish theoretical convergence results for Iteratively Regularized Gauss Newton (IRGN) method combined with a generalized Tikhonov regularization. The generalized Tikhnov regularization using a seminorm generated by a linear operator is motivated by the decomposition of the parameter space into diffusion coefficient D and absorption coefficient μ for the exponentially ill-posed inverse problem in optical tomography. We validate our theoretical results using simulations for a one dimensional version of the optical tomography inverse problem. We conclude that the new method contributes greater flexibility for implementations of IRGN solutions of ill-posed inverse problems in which differing scales in physical space hinder standard IRGN inversions.

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