AWM Event

A Parameter Decomposition Scheme for Iteratively Regularized Gauss-Newton

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Abstract: A new convergence result for an Iteratively Regularized Gauss Newton (IRGN) algorithm with a Tikhonov regularization term using a seminorm generated by a linear operator will be presented [SRK07]. The convergence theorem uses an a posteriori stopping rule and a modified source condition, without any restriction on the nonlinearity of the operator. The theoretical results are illustrated by simulations for a 2D version of the exponentially ill-posed optical tomography inverse problem for the diffusion and absorption coefficient spatial distributions. The modified Tikhonov regularization performs the mapping of the minimization variables, which are the coefficients of the spline expansions for the diffusion and absorption, to physical space. This incorporates the inherently differing scales of these variables in the minimization, and also suggests relative weighting of the regularization terms with respect to each parameter space. The modified IRGN allows greater flexibility for implementations of iteratively regularized solutions of ill-posed inverse problems in which differing scales in physical space hinder standard IRGN inversions.

Monday, December 8, 2008, 4:00 pm
Mathematics and Science Center: W301

Mathematics and Computer Science
Emory University