Numerical Study Of Algorithms For The Multimodal (Hybrid) Conductivity Inverse Problem

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The multimodal (hybrid) problem of reconstructing the isotropic conductivity from a single measurement of the magnitude of current density is considered. For a stationary electromagnetic field, this problem can be reduced to a nonlinear degenerate elliptic differential equation with the Dirichlet condition on the boundary. Since the energy functional associated with this equation has a unique minimizer, the conductivity can be uniquely determined from such a data and some minimizing sequences can be constructed. In this talk, two iterative procedures are considered. In the first procedure, the successive approximations regularized in the sense of Evans-Spruck were utilized. In the second procedure, an alternating split Bregman algorithm was applied to find the minimizer. The computational effectiveness of these procedures is demonstrated in several numerical experiments with the realistic distribution of conductivity and simulated data.