AN ALTERNATING DIRECTION MULTIPLIER METHOD FOR THE INVERSION OF FDEM DATA

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In this talk, we focus on the numerical solution of nonlinear inverse problems in applied geophysics. Our aim is to reconstruct the structure of the soil, i.e., either its electrical conductivity or the magnetic permeability distribution, by inverting Frequency Domain Electromagnetic (FDEM) data to possibly identify the presence of sites of archaeological relevance. This is a very challenging task since the problem is nonlinear and severely ill-conditioned. To solve the nonlinear inverse problem, we propose an Alternating Direction Multiplier Method (ADMM) algorithm, we prove its convergence, and propose an automated strategy to determine the parameters involved. Moreover, we present two heuristic variations of the ADMM that either improve the accuracy of the computed solutions or lower the computational cost. The effectiveness of the different proposed methods is illustrated through a few numerical examples.