

Electromagnetic Inverse Problems

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Inversion of geophysical data is complicated by the fact that the data are invariably contaminated by noise and are acquired at a limited number of observation points. Moreover, mathematical models are usually complicated and yet are also simplifications of the true geophysical phenomena. As a result, solutions are ambiguous and error-prone. The principal questions arising in geophysical inverse problems are the existence, uniqueness and stability of the solution. The solutions can be based on linearized and nonlinear inverse techniques, and can include different approaches, such as least-squares, gradient type (including steepest descent and conjugate gradient), and others. A central point of this talk is the application of the so-called "regularizing" algorithms for the solution of ill-posed inverse problem in electromagnetics. These algorithms can use a priori geologic and geophysical information about the earth's subsurface to reduce the ambiguity and increase the stability of the solution.