

Optimization methods at local /global scale applied to the inversion of geophysical data

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Predicting the result of a measurement requires (1) a model of the system under investigation, and (2) a physical theory linking the parameters of the model to the parameters being measured. This prediction of observations, given the values of the parameters defining the model, constitutes the "normal problem," or, in the jargon of inverse problem theory, the forward problem. The "inverse problem" consists in using the results of actual observations to infer the values of the parameters characterizing the system under investigation.

Inverse problems may be difficult to solve for at least two different reasons: (1) different values of the model parameters may be consistent with the data, and (2) discovering the values of the model parameters may require the exploration of a huge parameter space.

Most of the formulations of inverse problems proceed directly to the setting of an optimization problem, so we present different optimization approaches to solve the problem.