

عنوان مقاله:

DC Electrical Resistance Tomography Inversion

محل انتشار:

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خلاصه مقاله:

Direct current electrical resistivity imaging is provided by measuring the vertical and horizontal electrical potential variations of subsurface structures using surface and borehole records. To recover the resistivity tomograms from the observed data, a non-linear inverse problem is required to be iteratively solved. A ۲.۵-dimensional forward modeling based on the finite-difference method with rectangular meshes is also formulated. The two-dimensional reconstruction of earth resistivity data is implemented using a smoothness constrained inversion algorithm (i.e. Occam's method), wherein a Gauss-Newton technique for updating the sensitivity function is proposed. After verifying the accuracy and efficiency of the forward modeling and the sensitivity function calculation, the inversion algorithm is tested on synthetic data from both geometrically simple and complicated bodies and a real data set. A stopping criterion based on the noise level, roughly estimated using the method of reciprocal resistance measurements, is also provided leading to preventing over-or under-interpreted structure during the inversion process. The numerical experiments reveal that the proposed inversion algorithm provides stable inversion results and an acceptable representation of the main features and structure of the models without producing spurious effects. Furthermore, to deal with the reliability of the recovered models, a model sensitivity analysis is implemented using the resolution density distribution. All used formulations and concepts are part of a Matlab source code developed during this study.

کلمات کلیدی:

Electrical Resistivity Tomography, ۲.۵-D non-linear inversion, Resolution density

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