ON THE STRUCTURE ELECTROMAGNETIC INVERSE PROBLEM

PETER MARTYSHKO 1, Alexey Roublev 2

1 Institute of Geophysics Ural Branch of RAS, Yekaterinburg, Russia, e-mail: pmart3@mail.ru
2 Institute of Geophysics Ural Branch of RAS, Yekaterinburg, Russia, e-mail: A.Roublev@list.ru

Inversion of electromagnetic (EM) data in geophysical prospecting involves solution of a nonlinear-operator equation of the first kind (with an implicit ill-conditioned operator). The numerical solution of such equations requires considerable expenditures of computer time. The TIP equations are derived for EM fields satisfying the Helmholtz and diffusion equations. For the theoretical inverse problem (TIP) the author was able to obtain explicit equations for the electrical and magnetic fields, to develop effective algorithms for solving these equations, and construct numerical examples. A TIP is one in which the governing fields are specified explicitly, usually as the field of singular sources lying in a half-space. Solution of a TIP can be the last step of interpretation methods that first approximate observed data with the fields of singular sources. It also makes possible the construction of geologically meaningful equivalents for different classes of singular sources. We constructed some numerical examples solving EM Inverse Problem (for different earth-air boundaries).
We have obtained the new inverse problem equations of electromagnetic fields on the base representation for E and H by M. Zhdanov. There are the first generation equations with explicit operators. We have considered quasi-stationary field, monochromatic field and common case. As a result of inverse problem solving we obtain the surfaces with different values of conductivity (permeability), which generated the same (electrical or magnetic) field. We have obtained some numerical examples.

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Peter Martyshko, Institute of Geophysics Ural Branch of RAS, 620016 Yekaterinburg, Russia, Amundsen str. 100., tel: +73432678868, fax: +73432678872, e-mail: pmart3@mail.ru