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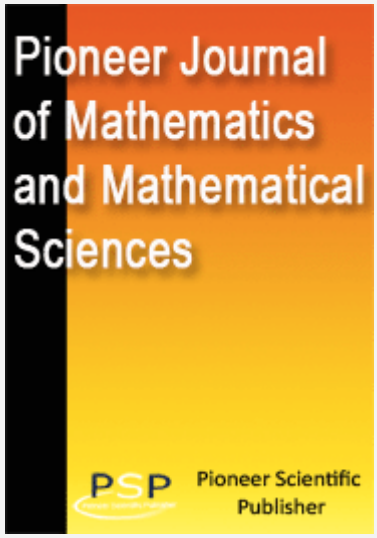

MATHEMATICAL INVERSE PROBLEM OF MAGNETIC FIELD FOR TRANSITIONAL GROUND PROFILE

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Abstract

Magnetic field response due to the injection of electric current into the ground can be used to explore the earth structure. We derive analytical solutions of the steady state magnetic field due to a direct current source on two types of multilayered earth structures including layers having linearly varying conductivities and layers having binomially varying conductivities. Our solutions are obtained by solving a boundary value problem in the wave number domain and then transforming the solution in the wave number domain back to the spatial domain. The propagator matrix technique is used to formulate recurrence relations for solving the problems. One of these relations is applicable to general cases in which the layers have constant, linearly or binomially varying conductivities. An inverse problem via the use of the Newton-Raphson optimization technique is introduced for finding the conductivity parameter. The optimal result of our model is close to the true value after using only 3 iterations.

Keywords and phrases: Hankel transform, inverse problem, magnetic field, transitional layer.