Finite difference resistivity modelling for arbitrarily shaped two-dimensional structures

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ABSTRACT
Resistivity surveying is commonly interpreted in term of one dimensional approach, which is based on the assumption that the subsurface consists of a system of parallel, horizontal, homogeneous and isotropic layers. Very often this assumption amounts to a gross simplification of the actual geology. Consequently, 1D-interpretation can not overcome equivalence problems, lateral and vertical in-homogeneity, as well as it can not determine more realistic subsurface structures. However, if we use a two-dimensional approach by making provision for the variation of resistivity in two directions, x and z direction or y and z direction (two-dimensional interpretation), and by assuming that no resistivity variation along the third orientation (i.e. y or x axes), a more realistic model of the subsurface can be constructed.

Fundamental equations, finite-difference equations, numerical algorithm and modification of Fortran computer codes, based on Dey's codes, are described in this Masters Thesis.

The simulations of 2D-resistivity modelling for equivalence problems, lateral and vertical in-homogeneity, as well as case study of 2D-resistivity modelling in determining resistivity structures in Ulubelu Geothermal Prospect, Indonesia, are also presented. It has shown that the limitations of 1D-interpretation can be overcome by using the two-dimensional approach.