



A comparison between non-linear optimization methods of Bayesian inversion and genetic algorithm for inverting spectral induced polarization data for Cole-Cole parameters

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The induced polarization (IP) method has been used in mining prospecting and increasingly in environmental investigations because IP measurements are very sensitive to the low frequency capacitive properties of rocks and soils. Cole-Cole model parameters widely use to interpret both of time and frequency domain induced polarization data.

Among many studies in which Cole-Cole parameters are estimated from SIP measurements on soils and rocks, the majority use least squares methods. In this work, we developed a Bayesian method with simulated annealing sampling algorithm to invert for double Cole-Cole parameters from SIP data. We also reproduced the genetic algorithm developed by Cao et al. and compared performance of simulated annealing method with genetic algorithm method through inversion of synthetic data.

Both of two methods are provides a global approach for inverting SIP data for Cole-Cole parameters; the obtained estimates are independent of initial values. Our results show that for the SIP synthetic data with random noises up to 10%, the inversed parameters obtained from simulated annealing method in comparison with genetic algorithm method are more close to the real parameters.