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Spectral induced polarization (SIP) measurements are now widely used to infer mineralogical or hydrogeological properties from the low-frequency electrical properties of the subsurface in both mineral exploration and environmental sciences. We present an open-source program that performs fast multi-model inversion of laboratory complex resistivity measurements using Markov-chain Monte Carlo simulation. Using this stochastic method, SIP parameters and their uncertainties may be obtained from the Cole-Cole and Dias models, or from the Debye and Warburg decomposition approaches. The program is tested on synthetic and laboratory data to show that the posterior distribution of a multiple Cole-Cole model is multimodal in particular cases. The Warburg and Debye decomposition approaches yield unique solutions in all cases. It is shown that an adaptive Metropolis algorithm performs faster and is less dependent on the initial parameter values than the Metropolis-Hastings step method when inverting SIP data through the decomposition schemes. There are no advantages in using an adaptive step method for well-defined Cole-Cole inversion. Finally, the influence of measurement noise on the recovered relaxation time distribution is explored. We provide the geophysics community with a opensource platform that can serve as a base for further developments in stochastic SIP data inversion and that may be used to perform parameter analysis with various SIP models.

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