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光滑模型与尖锐边界结合的MT二维反演方法

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Smoothest model and sharp boundary based two-dimensional magnetotelluric inversion

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摘要

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摘要 如何得到快速稳定的反演结果和更清晰的地质体分界面等问题仍然是当前MT反演研究的一个重点.为了解决反演结果不能得到清晰的电性分界面的问题,本文在前人研究的基础上,基于OCCAM反演以及突出尖锐边界反演的思想,结合最小支撑梯度泛函,构建了新的反演目标函数,并利用共轭梯度法优化目标函数,实现了一种光滑模型与尖锐边界结合的MT二维反演方法.模型实验证明了该方法的准确性,通过与已发表的相关反演方法的结果进行比较,证明了该方法在光滑稳定的基础上可突出对尖锐电性边界的刻画.对广东徐闻地区的实测MT资料进行了处理,表明了该方法的适用性和效果.

关键词 大地电磁测深, OCCAM反演, 光滑模型, 尖锐边界, 共轭梯度反演

Abstract: How to get the rapid and stable inversion results and the clear geological interfaces is a focus problem in current Magnetotelluric (MT) inversion. With the purpose to represent clear boundary with resistivity discontinuity, the paper integrates the ideas of OCCAM inversion and sharp boundary inversion (SBI) to construct a new objective function for inversion by using the minimum gradient support functional and conjugate gradient inversion method to solve the optimal minimum. So the 2-D MT inversion method based on OCCAM and SBI is fulfilled. Through the model tests and comparisons with the related published inversion results, this method is proved accurate in determining sharp electrical interfaces based on the smoothest and stable models. It is also applied to process the field observed MT data in the regions of Guangdong Xuwen, the results indicate the effectiveness and feasibility of this method.

Keywords

Magnetotelluric (MT), OCCAM inversion, Smoothest model, Sharp boundary inversion, Conjugate gradient (CG)

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