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利用大地电磁三维反演方法获得二维剖面附近三维电阻率结构的可行性

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The possibility of obtaining nearby 3D resistivity structure from magnetotelluric 2D profile data using 3D inversion

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摘要 大地电磁野外实测数据目前大多为二维剖面数据.如何反演这些二维剖面数据获得较为接近实际地电情况的结果,是多数大地电磁工作者关心的问题.我们通过对理论模型的三维响应进行分析和对合成数据及实测资料的反演结果进行对比研究,讨论了利用三维反演的方法来获得大地电磁二维剖面附近三维电阻率结构的可行性.结果表明:可用三维反演的方法来解释二维剖面数据.对大地电磁二维剖面的张量数据进行三维反演,不仅可以沿剖面获得较好的二维断面结果,还能够得到二维反演所不能获得的剖面附近的三维电阻率结构信息.合成数据的反演算例表明:对二维剖面数据进行三维反演时,对角元素对于圈定剖面附近三维异常体的空间分布具有独特作用,应尽量反演所有的张量元素.

关键词: 大地电磁反演 二维 三维 张量数据

Abstract: Currently, most of MT(magnetotelluric) data are still collected on 2D profiles. The issue that most MT researchers concern is how to invert these 2D profile data to get better results, which are closer to the real structure. Based on the analysis of 3D tensor impedance response generated from the test models and on the study of the inversion results of synthetic data and field data, we discuss the possibility of obtaining nearby 3D resistivity structure from magnetotelluric 2D profile data using 3D inversion. The results show that it is possible to interpret 2D profile data using 3D inversion method. Not only a reasonable image beneath the profile but also reasonable pictures of nearby 3D structure which can not be got by 2D inversion can be obtained using all tensor elements of the 2D profile data in the 3D inversion. The synthetic examples show that the on-diagonal elements have special effect on recovering the distribution of 3D abnormity near the profile. Therefore, all the tensor elements are suggested to be used in 3D inversion to interpret the profile data.

Keywords: Magnetotelluric inversion 2D 3D Tensor elements

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