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用积分方程法研究源与勘探区之间的三维体对CSAMT观测曲线的影响

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Research on the effect of 3D body between transmitter and receivers on CSAMT response using Integral Equation method

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摘要 在可控源音频大地电磁法野外作业中，源和勘探区间的距离可达几公里，为了了解源和勘探区间的异常体对勘探区内异常响应的影响，我们用三维压缩积分方程法做了数值模拟研究.首先对勘探区目标体进行了数值模拟，发现在高频时，观测到的异常中心位于目标体的正上方，随着频率降低，出现异常中心向远离源的方向略有移动的现象，所以对三维异常体最好用3D软件来解释.然后，对源和勘探区间存在三维异常体的情况进行了数值模拟与分析讨论.模拟结果表明只有当三维异常体达到较大的规模时，才会对目标体上方的观测曲线造成影响，否则其电阻率的变化及埋深的变化对观测曲线的影响较小，可以忽略.当异常体在源方向有延伸时，观测曲线受到的干扰最大，沿垂直源布设的方向延伸时引起的干扰中等，垂直地面向下延伸引起的干扰最小.

关键词 三维, 压缩积分方程法, 源和勘探区间三维异常体, 影响

Abstract： In the field work using the Control Source Audio-frequency Magnetotelluric method, the space between the transmitter and the receivers is up to several kilometers. In order to study the effect of the anomalous body locating at between the transmitter and the receivers, we simulate the CSAMT response using 3D Contraction Integral Equation method. First we simulate the response of the target body in the survey area. We found that the center of the anomaly locates above the target at high frequency but shifts slowly away from the source with the frequency decreasing, therefore 3D interpretation method should be considered if there is a 3D anomalous target body in the survey area. Then we simulate the effect of the 3D anomalous body between the transmitter and receivers on the response of the target body in the exploration area. The 3D anomalous body could affect the response of the target only when the size of the anomalous body is large enough, otherwise the effect can be ignored. The effect is large when the anomalous body extends in source direction; it is medium when the body extends in the direction perpendicular to the transmitter and low when extending in vertical direction.

Keywords 3D, Contraction integral equation method, Anomalous between transmitter and receivers, Effect

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