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石油地球物理勘探
OIL GEOPHYSICAL PROSPECTING

三维井间电磁最小二乘法反演

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Three-dimensional cross-well electromagnetic inversion using the least-square method

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摘要 引入积分方程法对空间位置变化的井间电磁三维油气藏模型进行模拟研究，指出不同井孔中油气藏电磁场异常特征各不相同，是开展井间异常体三维反演的基础。采用最小二乘法对四个油气田注水进程电阻率变化模型及考虑储层电阻率三维井间电磁场进行反演研究，反演结果表明，三维井间电磁最小二乘法反演可用于确定油气藏的空间分布和物性参数及其储层电阻率参数，可为井间电磁探测技术应用于油气田开采动态监测和探测剩余油气藏提供了新的途径。

关键词： 井间电磁 积分方程法 最小二乘法反演 油气藏探测

Abstract： Practical applications of cross-well electromagnetic depend on three-dimensional effective simulation and interpretation. Using three-dimensional integral equation methods, we simulate a three-dimensional oil-gas model with variant spatial position. It is found that electromagnetic anomalous in different wells have different morphological characteristics. So three-dimensional inversions for cross-well electromagnetic are needed. Then inversions of four performance of waterflooding operation with variant-resistivity models and variant-resistivity strata are realized with least-square method. The result shows that three-dimension cross-well electromagnetic inversion with the least-square method can map spatial distribution of reservoir resistivity and strata resistivity, and their parameters. This will provide a new approach for dynamic process monitoring in oil and gas production.

Keywords： cross-well electromagnetic integral equation inversion least-square method reservoir exploration

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