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论文

多相流动电磁波成像测井测量敏感场计算

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摘要: 在多相流动电磁波成像测井研究中, 测量敏感场是设计测量仪器和研究图像重建算法的前提工作. 本文用数值方法计算多相流动电磁波成像测井测量敏感场. 根据测量探头电极阵列的对称性, 将三维敏感场问题划分为轴向和横向两个平面问题, 然后应用有限元算法求解两个平面电势分布问题, 对于不同介质模型, 计算各种测量条件下测量区域内电势分布, 进而根据电势分布计算测量敏感场. 结果表明测量敏感区域为发射电极到测量电极的弧形区域, 在发射电极到测量电极的电势梯度线上, 测量敏感函数近似于一个指数函数.

关键词: 多相流 电磁波 成像测井 敏感场

CALCULATION OF SENSITIVITY FIELD FOR ELECTROMAGNETIC TOMOGRAPHY IN MULTIPHASE FLOW WELL LOGGING

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Abstract: The sensitivity field is of great importance for the optimal design of the Electromagnetic Tomography (EMT) in multiphase flow well logging tools and images reconstruction. We calculate using a numerical

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method. For the facility of analysis, the calculation is performed in 2 planes based on the symmetry of the sensor, though the sensitivity field is 3 dimensional. The analysis contains 2 connected steps. First, the potential distribution within the measure array is calculated using FEM (Finite Element Method). Then, the gradient of the potential is acquired according to the numerical computation. The result shows that the sensitivity field has an arc-shape within the region from transmitting electrode to measuring electrode, and it can be expressed approximately using an exponential function.

Keywords: Electromagnetic tomography
Multiphase flow Imaging logging Sensitivity field.

收稿日期 2002-07-22 修回日期 2003-06-03 网络版发布日期

DOI :

基金项目:

通讯作者:

作者简介:

作者Email:

PDF Preview

