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## 盐水泥浆条件下定向井双侧向测井环境校正方法研究

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### Environment correction method of dual laterolog in directional well

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摘要

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摘要 在定向井中, 双侧向测井数据由于受井眼、围岩、井斜、径向侵入等环境因素的影响, 难以准确地估算储层的电阻率和更准确地识别储层流体. 本文拟提出图版法和反演法相结合的思路来研究地层视电阻率的校正问题. 首先, 针对研究区的测井环境和钻井液电阻率, 计算了不同尺寸井眼的双侧向测井响应, 绘制了井眼校正图版; 然后, 针对斜度井地层模型, 采用三维有限元方法计算了不同井斜、不同厚度地层的测井响应, 构建了井斜-围岩/层厚图版, 利用该图版实现了井眼校正和井斜-围岩/层厚的电阻率快速校正. 最后, 针对钻井液侵入的影响, 采用反演方法计算了侵入半径和地层真电阻率, 最终实现了双侧向测井的环境校正. 利用上述理论与方法对海洋中定向井的双侧向测井资料进行了环境校正, 提高了储层流体定性识别和定量评价的精度.

关键词 定向井, 双侧向测井, 三维有限元(3D FEM), 环境校正

Abstract: In directional wells such as deviated wells and horizontal wells, dual laterolog of resistivity is usually not accurate enough due to some environmental factors such as borehole, surrounding bed, well deviation, radial invasion zone and so on, so it is difficult for fluid identification and quantitative evaluation of the reservoirs. A new combination method of chart correction and inversion is proposed to study apparent resistivity correction of dual laterolog. Firstly, according to borehole size and drilling fluid properties, the dual laterolog resistivity responses are calculated with three dimensional finite element method (3D FEM) and the borehole correction charts are constructed. Then, according to all kinds of formation models with different deviation angles and bed thickness, the resistivity responses are computed and the well deviation and surrounding bed or thickness correction charts are built. Then, according to the law illustrated in the correction charts, the borehole, well deviation surrounding bed/thickness corrections of the logging resistivity are realized fast. Finally, with respect to the effect of drilling fluid invasion, the invasion radius and true resistivity of the formation are calculated using the inversion method, and the environment correction for dual laterolog is achieved completely. After the theory is applied to dual laterolog data in marine deviated well, the dual laterolog resistivity correction results can enhance the accuracy of qualitative identification and quantitative evaluation of the reservoirs.

Keywords [Directional wells](#), [Dual laterallog](#), [Three dimensional finite element method \(FEM\)](#), [Environment correction](#)

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