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论文

基于简化的Pride理论模拟声电效应测井响应

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摘要: 针对声电效应测井问题, 提出了一种全波列数值模拟方法. 该方法忽略声电效应测井时转换电场对声场的影响, 并将电场视为似稳场. 采用点声源模型, 依据Biot理论得出了井外孔隙介质声场的表达式, 运用这些表达式和似稳电场近似方法, 导出了声电效应测井时转换电场的计算公式. 在计算出的转换电场波形中, 有伴随斯通利波的电场、伴随纵波和横波的电场、和临界折射电磁波场. 在25kHz以下的频率范围内, 依据这种方法计算出来的声电转换波波形与依据完整Pride理论计算的波形一致.

关键词: 声电效应 孔隙介质 测井 弹性波 电磁场

SIMULATION OF ACOUSTO ELECTRIC WELL LOGGING BASED ON SIMPLIFIED PRIDE EQUATIONS

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Abstract: A numerical full waveform simulation method is proposed to study the acousto electric well logging response. The acoustic field, taken as uninfluenced by the converted electric field, is solved separately.

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The electric field is taken as quasi-steady. A point pressure source is assumed to be on the borehole axis. The full Biot theory is adopted to obtain expressions of the acoustic field around the borehole. These acoustic expressions are then used to formulate the converted electric fields in and out of the borehole. In the calculated full waveforms of the converted electric field, there are electric waves that accompany the compressional, the shear and the Stoneley waves. And there is a critically refracted electromagnetic wave, which travels along the borehole wall. The waveforms are practically the same as calculated with the full Pride theory under frequency of 25kHz.

Keywords: Electrokinetic effect Porous medium Logging Elastic wave Electromagnetic field.

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