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叠前波形反演技术在深水扇储层预测中的应用

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Application of Prestack Waveform Inversion Technique for Deepwater Fan Reservoir Prediction

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摘要/Abstract

摘要 :

为提高无井或少井区储层预测准确度和降低深水勘探风险,采用基于叠前波形反演技术提取控制井曲线的方法,进行深水扇储层预测。叠前波形反演技术是基于遗传算法的反演方法,其通过复制、交换和变异运算来产生下一代,再与叠前入射角道集数据对比和反复迭代而输出最佳结果。某被动大陆边缘深水扇A区块均方根振幅属性显示其重力水道较发育,但缺乏钻井证实。在已钻井位置进行叠前波形反演计算,通过井曲线以及叠前入射角道集对比验证了该方法在研究区的可靠性。根据控制井选取原则选取了12口控制井,反演得到了密度和纵波与横波速度曲线,开展叠前弹性波阻抗反演。纵波阻抗刻画该区重力水道在东南方向物源供给之下,平面上具有叠置型水道向迁移型曲流状水道演化的特点,泊松比指示的气层分布受构造与岩性综合控制。结果表明叠前波形反演技术对于深水勘探是一种较为可靠实用的技术。

关键词: 叠前波形反演, 深水勘探, 重力水道, 储层预测

Abstract:

In order to increase the accuracy of reservoir prediction and reduce the risk of deepwater exploration with sparse or no well control,the deepwater fan reservoir is predicted by the method of control well log extraction which is based on the prestack waveform inversion (PSWI) technique.The PSWI using genetic operation of reproduction,crossover and mutation to produce the next generation,and output the best results by prestack incidence angle gather data comparison and iteration.RMS amplitude attribute shows deepwater fan A block is dominated by gravity flow channel but lack of drilling in a passive continental margin.The reliability of the method is verified by comparison of log curve and synthetic incidence angle gather with observed well data in a well,12 control wells are selected according to well selection principle and outputted density,P-wave and S-wave velocity curves by PSWI.P-wave impedance outputted from prestack elastic inversion shows the evolution of gravity channel from stacking type to meandering type by the source in southeast,and poisson's ratio shows gas zone is controlled by structure and lithology.PSWI technique for deepwater fan exploration is a reliable and practical technique.

Key words: Prestack waveform inversion, Deepwater exploration, Gravity flow channel, Reservoir prediction

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