

引用本文(Citation):

宗兆云, 印兴耀, 吴国忱. 基于叠前地震纵横波模量直接反演的流体检测方法. 地球物理学报, 2012,55(1): 284-292,doi: 10.6038/j.issn.0001-5733.2012.01.028

ZONG Zhao-Yun, YIN Xing-Yao, WU Guo-Chen. Fluid identification method based on compressional and shear modulus direct inversion. Chinese J. Geophys. (in Chinese), 2012, 55(1): 284-292, doi: 10.6038/j.issn.0001-5733.2012.01.028

基于叠前地震纵横波模量直接反演的流体检测方法

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Fluid identification method based on compressional and shear modulus direct inversion

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摘要

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摘要 流体因子是储层流体识别的重要方法,而叠前地震反演是获得流体因子的有效途径之一.本文从流体因子的构建出发,基于多孔弹性介质岩石物理模型,建立了流体因子与纵横波模量之间的直接关系,避免了流体因子计算所需的密度参数无法准确求取的问题,通过推导基于纵横波模量的Zeoppritz近似方程及弹性阻抗方程,探讨了基于弹性阻抗的纵横波模量直接反演方法,模型与实际应用表明,基于弹性阻抗的纵横波模量直接反演方法合理、可靠,减少了常规方法间接计算纵横波模量带来的累积误差,基于纵横波模量的流体因子计算方法有较好的实际应用效果.

关键词 流体因子, 纵横波模量, 直接反演, 叠前地震

Abstract: Fluid factor, which can be derived from pre-stack seismic inversion efficiently, is an important method for fluid indication. Firstly, we start from the reconstruction of fluid factor and gain the direct relationship between fluid factor and compressional modulus, shear modulus based on rock physics model for multi-porosity media; in this way we can gain fluid factor directly without knowing the density information which could not be inverted correctly. Then, through derivation of a new elastic impedance equation from Zeoppritz approximation, we study the compressional modulus and shear modulus direct inversion method based on new elastic impedance equation. Finally, the model and practical test shows that this method is more stable and reasonable, which leads to less error brought by accumulating calculation with common elastic impedance inversion method, and the method to gain fluid factor is efficient.

Keywords Fluid factor, Compressional and shear modulus, Direct inversion, Pre-stack seismic data

Received 2010-06-17;

Fund:

国家高技术研究发展计划(863)项目(2006AA09A102)和国家重点基础研究发展计划(973)项目(2007CB209605)共同资助.

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