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摘要　油气勘探开发实践证明，裂缝常常是油气藏存储的空间或运移的通道，因此，裂缝各向异性介质中地震波场的研究越来越倍受关注，国内外很多岩石物理学者、地球物理专家等对裂缝信息的描述提出了很多理论认识与方法技术.本文根据Eshelby-Cheng各向异性裂缝介质模型理论，求取各向异性裂缝介质的弹性参数，并建立Eshelby-Cheng各向异性裂缝介质的波动方程，利用时间错格伪谱法对含流体裂缝介质进行数值模拟，模拟结果表明，采用时间错格伪谱法能有效解决各向异性介质的波场传播，利用时间错格有限差分算子替代普通的差分算子来求解时间导数，利用快速傅氏变换求解空间导数，大大提高了正演模拟的计算精度与计算效率.并且与各向同性介质相比，地震波在含流体裂缝各向异性介质中的传播要复杂得多，各向同性介质层中的波是纯的，其横波不会发生分裂，而在各向异性介质层中，横波将发生分裂.

# Numerical modeling of the seismic wave-field in cracked media with liquid

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**Abstract** The practice of oil exploration proved that the cracks are space of the oil and gas and channels of them to move, thereby the wave-field of cracked anisotropic media draw more and more attention. Many rock physicists and geophysicists proposed many theories and technique to describe the information of cracks. According to the theory of the Eshelby-Cheng anisotropic cracked models, we obtain the elastic parameters of the anisotropic cracked media, and establish the wave equation of the Eshelby-Cheng anisotropic cracked media, apply time-staggered Pseudo-Spectral method to modeling the cracked media with liquid, and study the propagation law and characters of the seismic waves in cracked media with liquid. The results proved that it's efficient to modeling the wave-field by time-staggered Pseudo-Spectral method. And the wave-field is more complex in anisotropic media than in isotropic media.

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