应用地球物理学

表驱三维角度域Kirchhoff叠前时间偏移成像方法

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摘要   针对传统Kirchhoff叠前时间偏移方法的一些不足，以及振幅随入射角、方位角变化(AVA/AVAZ)分析的需要,本文提出一种基于射线理论的三维叠前时间偏移角度域成像方法.它通过横向均匀介质中稳健的射线追踪建立单程波走时和传播角度的数值表，然后在此基础上估算反射波双程走时以及在界面处传播的方位角和入射角，最后基于脉冲响应叠加原理获得三维构造图像和方位\|角度域共成像点道集.与传统方法不同之处在于，上述过程均考虑了地震波在垂向变速介质中的射线弯曲效应和三维传播特征，有利于准确提取随入射角和方位角变化的振幅和时差信息.理论模型合成数据和实际地震资料测试结果展示了方法的优越性与实用性.

关键词   叠前时间偏移   角度域成像   方位角   入射角

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Table-driven 3-D angle-domain imaging approach for Kirchhoff prestack time migration

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Abstract To overcome some of the shortages of widely-used Kirchhoff presatck time migration technique and to provide more powerful supports for amplitude versus incidence-angle and azimuth (AVA/AVAZ) analysis, we present a 3-D angle-domain imaging approach for prestack time migration based on the ray theory. Numerical tables of one-way traveltime and propagation angle for the reflection waves are first established by improved ray-tracing algorithm in the laterally homogeneous media. After the two-way traveltimes, weighted factors, azimuth and incidence angles at the reflectors are estimated, 3-D structural images and angle-domain common-image gathers are obtained through superposition of the impulse responses in the process of prestack time migration. Unlike the conventional approach, the implementation in this paper has taken ray-bending effect and 3-D propagation property of seismic waves in the real media into account. So it helps to extract variations of amplitude and moveout versus azimuth and incidence-angle more accurately. Synthetic and real data examples demonstrate the advantage and practicability of this technique.

Key words Presatck time migration; Angle-domain imaging; Azimuth; Incidence angle

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