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复杂构造三维地震观测系统设计的共聚焦分辨率分析

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Resolution analysis of seismic acquisition geometries by focal beams in 3D complicated media

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摘要

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摘要 三维地震观测系统共聚焦分辨率特性分析突破传统以点论证为基础的观测系统分辨率分析方法,面向地质目标定量预测三维观测系统地震成像的空间分辨率和振幅精度.基于Fourier有限差分(FFD)大步长波场延拓和Born-Kirchhoff小步长波场插值递推方法,本文介绍了一种复杂介质条件下三维地震观测系统共聚焦分辨率特性快速分析方法.对给定的速度模型,该方法能够分析拟采用的三维地震观测系统设计方案对复杂构造的成像分辨率与AVP属性,从而为进一步的偏移成像与储层分析提供保证.最后本文以SEG/EAGE三维盐丘模型为例设计满覆盖为16次的三维地震观测系统,并实施三维共聚焦分辨率特性分析.

关键词 三维地震观测系统设计, 复杂介质共聚焦分辨率分析, Fourier有限差分大步长波场延拓, Born-Kirchhoff小步长波场插值递推

Abstract: About dealing with the complex subsurface structures, the conventional survey design methods which do not take into account the subsurface are no longer valid. Based on the FFD large-step wavefield extrapolation and Born-Kirchhoff small-step wavefield interpolation, the paper presents a rapid resolution analysis of 3D seismic survey design by focal beams in complicated media. The method can be used in judging and adjusting the acquisition geometries by imaging resolution and AVP attributes. And then it can provide guarantee on seismic migration imaging and reservoir bed analysis. In the last section of this paper, the SEG/EAGE salt model is used to illustrate the method.

Keywords 3D seismic survey design, Resolution analysis by focal beams in 3D complicated media, Fourier finite-difference large-step wavefield extrapolation, Born-Kirchhoff small-step wavefield interpolation

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