方法技术

基于Wigner　Ville的谱分解效果分析

杨海涛1　，朱仕军1　，文中平2，常 智2，彭 才2，李佳阳3，李兴华4

1.西南石油大学，四川成都610500；2.四川石油管理局地球物理勘探公司，四川成都610059；　3.中　国石油化工股份有限公司西南分公司勘探开发研究院，四川成都610016；4.西安长庆科技工程有限责任公司，陕西西安710018

摘要　地震信号是典型的非平稳信号,地震谱分解实质上就是连续时频谱分析。谱分解不是惟一的过程,可供选用的算法很多。本次研究的是Wigner　Ville分布(WVD)算法，它不含任何窗函数，避免了时间分辨率和频率分辨率的互相牵制、难以兼顾的问题，获取了高精度的时频分辨率。首先介绍了WVD算法的基本原理和实现方法。把地震数据体从时间域转到频率域,求取每个地震道时间样点的频谱；然后按照频率重排产生共频率的剖面；再对各单一频率的剖面进行对比、分析和解释。理论分析和实际地震资料计算结果表明，WVD谱分解算法应用于地震资料解释中具有一定的可行性。

关键词　Wigner　Ville分布；谱分解；单频剖面

Effect analysis of spectral decomposition based on Wigner　Ville distribution

Yang Haitao, Zhu Shijun, Wen Zhongping, Chang Zhi, Peng Cai, Li Jiayang, Li Xinghua
Yang Haitao, Southwest Petroleum University, Chengdu 610500, China

Abstract Seismic signal is a typical non　stationary signal. Spectral decomposition in essence is a continuous time　frequency analysis of a seismic trace. Since time　frequency mapping is a non　unique process, there exist various ways for time　frequency analysis of non　stationary signals. This paper studied WVD algorithm, which does not involve any window function that bypasses the interaction between time resolution and frequency resolution and achieves higher resolution in both time and frequency. Firstly, we transformed seismic data cube from time domain into frequency domain and computed the frequency spectrum of every time point for each seismic trace. Secondly, we generated different single frequency sections by rearranging frequency contents. Finally we compared, analyzed, and interpreted each single frequency section. It is shown by theoretical analysis and real seismic data that WVD algorithm is advisable.

Key words   Wigner　Ville distribution; spectral decomposition; single frequency section

分类号　P631.4

DOI:

通讯作者:

作者个人主页: 杨海涛1　;朱仕军1　;文中平2;常 智2;彭 才2;李佳阳3;李兴华4