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基于波场数值模拟的瑞利波频散曲线特征及各模式能量分布

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Dispersion curves and mode energy distribution of Rayleigh wave based on wavefield numerical simulation

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摘要

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摘要 在实际地震瑞利波勘探中,由于各模式激发的能量不同,提取到的频散曲线的频段也不一样,有些频段因能量低,而不能被提取出来。因此各模式频散曲线的特征以及实际激发情况还需通过时间域地震记录来分析。本文采用数值模拟方法,首先得到瑞利波场数值模拟记录,然后由这些记录提取瑞利波的频散曲线,将提取得到的频散曲线与由频散方程计算得到的频散曲线进行比较,分析不同模型由时域记录提取出的频散曲线的特征及其频带范围,归纳总结多种模型的多阶模式频散曲线特征及各模式在瑞利波场中的能量分布情况。

关键词: 频散曲线 频散方程 瑞利波 波场数值模拟

Abstract: In the seismic exploration, Rayleigh wave dispersion curves are usually extracted from the time-domain seismic records, which involve shooting modes. Dispersion curves with different energy by different shooting modes correspond to different frequency bands. And those in low-energy frequency band cannot be extracted. Therefore, for dispersion curves based on dispersion equation, not all the modes of seismic records can be stimulated. The dispersion curve characteristics of each mode and its actual shooting conditions have to be analyzed by time domain seismic records. A numerical simulation method is adopted first to obtain simulated records of Rayleigh waves. Then dispersion curves are extracted from these records. Finally, these extracted dispersion curves are compared with the theoretical dispersion curves from dispersion function to analyze their characteristics and frequency range for different modes. The multiple-mode dispersion characteristics and its mode energy distribution in the Rayleigh wave field are also summarized in this paper.

Keywords: dispersion curves dispersion equation Rayleigh wave wavefield numerical simulation

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