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可控震源匹配扫描方法研究

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Matched sweep method for seismic vibrators

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摘要

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摘要 常规的可控震源Chirp扫描信号的地震响应存在着相关信号旁瓣大、分辨率低的缺点;用二元伪随机编码信号作为可控震源驱动信号,地震响应剖面中存在严重的相关噪声,降低了地震记录的信噪比.本文提出的可控震源匹配扫描方法,利用匹配伪随机序列调制正弦载波信号作为可控震源驱动信号进行扫描激发,得到两个匹配的原始地震记录,对两个匹配的原始地震记录分别解码后再进行最终的综合解码地震剖面.地震数值模拟的结果表明,该方法基本不存在常规Chirp扫描情形的旁瓣效应,可有效避免 m -序列相关噪声,其最后形成的综合解码地震剖面可以与脉冲震源的炮集记录相媲美.

关键词: 可控震源 匹配扫描 旁瓣效应 相关噪声 地震数值模拟

Abstract: Seismic response of conventional seismic vibrator driven by Chirp sweeping signals has the shortcomings of high side lobes and low resolution. When binary pseudorandom coded signals are used as vibrator drive signals, there are serious correlation noises in seismic response section, reducing the signal-to-noise ratio. The matched sweep method for seismic vibrator put forward in this paper utilizes sine carrier signal modulated by matched pseudorandom sequence pair as seismic vibrator drive signal to sweep and excite two matched original seismic records. After the two matched original seismic records are decoded, they are stacked to the final integration decoded seismic section. There are indications from results of seismic numerical simulation that the method basically does not have side-lobe effect of the conventional Chirp sweep case as has effectively avoided correlation noises in m -sequence coded sweeping cases, and the final integration decoded seismic section can compare favorably with shot assembly records of pulse sources.

Keywords: Seismic vibrator Matched sweeping Side-lobe effect Correlation noises Seismic numerical simulation

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