

岩土工程勘测中EH-4观测信号的小波分析

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收稿日期 2004-10-5 修回日期 2004-12-28 网络版发布日期 2008-3-18 接受日期 2004-10-5

摘要 EH-4连续电导率成像是新一代数字化的电磁法仪器。针对EH-4信号由于噪声等原因引起的不平稳性问题, 研究了EH-4信号在不同尺度下的小波分解, 由此建立信号的小波分析方法, 并与传统的窗口傅立叶变换的时频分析方法相比较。研究表明, 小波分析方法能从不同尺度对信号进行分析, 诊断出不平稳的病态信号, 对其处理或剔除, 有利于更全面、准确地解译信号。

关键词 [岩土工程; 勘测; EH-4; 小波分析](#)

分类号

WAVELET ANALYSIS OF EH-4 SIGNALS IN EXPLORATION OF GEOTECHNICAL ENGINEERING

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Abstract

EH-4 is the update numeral instrument of continuous conductivity imaging system with electromagnetic method. The numeral signals transferred by EH-4 must be transformed into frequency ones. Fourier transform is a kind of full analysis in frequency domain without any analysis function of time domain, and fails to consider the problems of unstable signals caused by noises. It is necessary to cull the noises. The original method culling noises is surveying and its mathematical expectation is used. Its drawback is obvious, that is, all the signals are not examined and therefore some unstable morbid signals are joined into the statistical analysis. The wavelet analysis method means analyzing each signal segment using wavelet function in different scales, and culling or revising unstable morbid signals. This method has full analysis function in both frequency domain and time domain. Through the study of discrete-time orthogonal wavelet decomposition, the signals observed by EH-4 are decomposed into different scale elements and analyzed in both time domain and frequency domain; subsequently the stability and quality of signals are ascertained in different scales. The study shows that the wavelet analysis method can analyze signals in different scales, detect unstable morbid signals and revise or cull them. It is one of effective means to analyze and detect signals in different frequency scales, and is useful to interpret signals all-round and accurately.

Key words [geotechnical engineering; exploration; EH-4 system,wavelet analysis](#)

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