多段微差爆破振动信号频带能量分布特征的小波包分析

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摘要　爆破振动分析是研究爆破振动危害控制的基础，也是控制爆破振动危害的前提。根据爆破振动信号具有短时非平稳的特点，利用小波包分析技术对满足分析要求的多段微差爆破振动信号的能量分布特征进行研究。首先，简略地介绍了小波变换与小波包分析的特点；其次，对6条多段微差爆破振动信号进行小波包分析，得到了爆破振动信号在不同频带上的能量分布图；最后，总结了多段微差爆破振动信号频带能量的分布特征。该分析手段为综合研究爆破地震效应特别是为将来构建振动速度－频率相关安全准则提供了一种有效的分析技术。

关键词　爆炸力学；能量分布；小波包分析；爆破振动；非平稳信号；多段微差爆破；MATLAB软件

分类号

ANALYSIS OF ENERGY DISTRIBUTIONS OF MILLISECOND BLAST VIBRATION SIGNALS USING THE WAVELET PACKET METHOD

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Abstract

 Blast vibration analysis is the foundation for studying the control of blasting vibration damage. Based on the characteristics of short-time non-stationary random signals，this paper investigates the energy distributions of blasting vibration signals by means of the wavelet packet analysis technique. In this paper，the characteristics

of wavelet transform and wavelet packet analysis are briefly introduced. Then，6 sets of blasting vibration signals of multi-interval-time in millisecond blasts are analyzed by using the wavelet packet analysis technique with MATLAB. Energy distributions for different frequency bands are obtained. The results show that the wavelet packet analysis method is an effective means for studying seismic effect induced by blasting，and is especially useful for establishing the velocity-frequency criteria.

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