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一种基于爆破振动信号小波分析的爆破危害评判新方法

刘敦文, 粟闯, 龚运高

(中南大学资源与安全工程学院, 湖南 长沙, 410083)

摘要: 基于Matlab小波分析软件, 利用小波包良好的时频局部化性质对现场监测的爆破振动信号进行能量分析, 得到爆破振动信号不同频带上的能量分布。根据爆破振动信号在传播过程中能量的变化规律及爆破振动信号的频带能量分布与爆破振动影响的密切关系, 据爆破振动信号主振频率所在频域能量和受控结构自振频率所在频域能量, 提出一种新的基于爆破振动信号小波分析的爆破危害评判方法。将计算实测点的爆破危害评定参数 α 与在该点观测到的建筑物的 α 进行对比。研究表明: 当 $\alpha > 0.235$ 时, 建筑物受损; 随着 α 增大, 建筑物受损情况加剧。

关键词: 爆破振动; 小波分析; 能量分析; 爆破危害; 综合评判方法

New method for blasting hazards evaluation based on wavelet analysis of blasting vibration signals

LIU Dun-wen, SU Chuang, GONG Yun-gao

(School of Resources and Safety Engineering, Central South University, Changsha 410083, China)

Abstract: Based on wavelet analysis software of Matlab, the energy of the monitoring blasting vibration signals was studied by means of the wavelet packet analysis, which had high resolvability and localization, and the energy distribution of blasting frequency bands was obtained. According to the energy variety regulation of blasting vibration signals in the dissemination process and the close relation between energy distribution for different frequency bands and the blasting vibration effect, a new method for blasting hazards evaluation based on the wavelet analysis of blasting vibration signals was proposed from the aspect of the energy on dominant frequency bands and natural frequency bands of controlled structure. The assess parameter of blasting vibration hazards α was compared with the actual impaired situation of building. The results show that the building is damaged when $\alpha > 0.235$. With the increase of α , the impaired situation of building is intensified.

Key words: blasting vibration; wavelet analysis; energy analysis; blasting damage; integrative evaluation method

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地 址：湖南省长沙市中南大学 邮编： 410083

电 话： 0731-88879765 传真： 0731-88877727

电子邮箱： zngdxb@mail.csu.edu.cn 湘ICP备09001153号