

应用地球物理学

坚硬顶板诱发煤体冲击破坏的微震效应

陆菜平^{1,2}, 窦林名^{1,2}, 王耀峰³, 杜涛涛²

1 中国矿业大学 煤炭资源与安全开采国家重点实验室, 徐州 221116

2 中国矿业大学 矿业工程学院, 徐州 221116

3 大同煤矿集团公司忻州窑煤矿, 大同 037000

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摘要 利用TDS-6微震采集系统测试了忻州窑煤矿组合煤岩试样变形破裂直至冲击破坏过程中的微震信号, 特别是冲击破坏前后微震频谱的变化规律.采用SOS微震监测系统, 对忻州窑煤矿8929工作面冲击矿压的微震活动规律进行了监测, 结果表明: (1) 冲击前兆信号呈现低频特征, 随着与主震间隔的时间越短, 主频越低.主震信号频谱较宽, 但低频(0~50 Hz)成份增加, 余震信号呈现高频特性. (2) 微震信号的频次、累积能量与主频之间呈负相关关系.尤其当工作面顶板来压以及诱发冲击矿压时, 微震信号的主频达到最低值. (3) 现场监测表明, 冲击前兆微震信号的主频为0~50 Hz, 且振幅较低.冲击主震信号频谱较宽, 但较低频(0~20 Hz)成份明显增加, 同时振幅达到极值.余震信号主频为0~200 Hz, 呈现高频、低振幅特征.

关键词 [采矿工程](#) [坚硬顶板](#) [冲击矿压](#) [微震](#) [前兆效应](#)

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Microseismic effect of coal materials rockburst failure induced by hard roof

LU Cai-Ping^{1,2}, DOU Lin-Ming^{1,2}, WANG Yao-Feng³, DU Tao-Tao²

1 State Key Laboratory of Coal Resources and Mine Safety, CUMT, Xuzhou 221116, China

2 School of Mining Engineering, CUMT, Xuzhou 221116, China

3 Xinzhouyao Coal Mine, Datong Coal Mine Group Corporation, Datong 037000, China

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Abstract By TDS-6 microseism (MS) test system, the MS effect of the compound coal-rock samples from Xinzhouyao Coal Mine was studied in the process of deformation, fracture and rockburst failure, especially the evolvement of MS frequency-spectrum before and after rockburst failure was revealed. Using SOS MS monitoring system, the MS activity patterns of working face 8929 of Xinzhouyao Coal Mine were measured. The achieved results are as follows. (1) The rockburst precursory signal shows low-frequency character, the shorter the interval time between precursory and mainshock signal is, the lower the main frequency is. The spectrum of mainshock signal is wider, but the low-frequency component (0~50 Hz) will increase obviously. The aftershock signal shows high-frequency feature. (2)The correlation between the events, the total energy and the main frequency of MS signals is negative. Especially when the pressure and rockbursts were induced by roof fracture, the main frequency of MS signals is lowest. (3) The main frequency of rockburst precursory signals is about 0~50 Hz by measurement in field, and amplitude is lower. The spectrum of rockburst signals is wider, and the low-frequency component (0~20 Hz) will obviously increase, simultaneously the amplitude reaches to maximum. After rockburst, MS signals show the high-frequency and low-amplitude feature, and main frequency is about 0~200 Hz.

Key words [Mining engineering](#); [Hard roof](#); [Rockburst](#); [Microseism](#); [Precursory effect](#)

通讯作者:

陆菜平 cplucumt@126.com

作者个人主页: 陆菜平^{1,2}; 窦林名^{1,2}; 王耀峰³; 杜涛涛²

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