

论文

煤与瓦斯突出冲击波的形成机理

苗法田, 孙东玲, 胡千庭

- 1 瓦斯灾害监控与应急技术国家重点实验室, 重庆400037;
- 2.中煤科工集团重庆研究院, 重庆400037

摘要:

根据煤与瓦斯突出过程中煤-瓦斯两相流运动参数的研究成果, 对不同流动状态下冲击波的形成机理进行了分析。当孔洞中喷出的煤-瓦斯两相流未超过临界状态或处于低度未完全膨胀状态时, 流体在巷道空间完全膨胀后的速度较低, 产生的冲击波超压值较小; 当高度或超高度未完全膨胀流体在巷道空间中膨胀时, 如果巷道空间足够大, 则流体将进行“爆炸式”加速过程并可能产生强冲击波; 而如果巷道空间受限时, 最终形成的冲击波的超压值较小, 但两相流的动压和膨胀过程中的气体静压可能会严重破坏矿井生产设备或设施。

关键词: 煤与瓦斯突出; 煤-瓦斯两相流; 临界状态; 冲击波; 机理

The formation mechanism of shock waves in the coal and gas outburst process

Abstract:

Based on research results of motion parameters of coal gas flow, this paper analyzes the formation mechanism of shock waves at different states of coal gas flow in the coal and gas outburst process. While the ejected coal gas flow has not exceeded the critical state, nor has it reached the state of low under expansion, both the flow velocity after complete expansion in the roadway, and the overpressure of forming shock wave will be small. While the high or super high degree of under expanded flow expands in the roadway, the flow will speed up with an explosive process if the roadway space is big enough. Conversely, if the roadway space is limited, the final overpressure of forming shock wave will be smaller, but the dynamic pressure of the two phase flow and gas static pressure in the expansion process could seriously damage mine production equipment or facilities. The results of these tests are significant to the pre warning and prevention of outburst disasters, the formulation of contingency plans, and the optimization of mine safety facilities.

Keywords: coal and gas outburst; coal gas flow; critical state; shock wave; mechanism

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通讯作者: 苗法田

作者简介: 苗法田(1981—), 男, 山东聊城人, 工程师

作者Email: mft_safety@163.com

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