

论文

矿井火灾应急救援系统的数值模拟及应用研究

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摘要:

为了应对矿井主进风巷道火灾造成的灾难, 研究进风巷胶带及电器电缆火灾发生后烟流在通风系统中的扩散运动, 建立矿井火灾应急救援系统, 通过预设多组可远程监控的风门, 在两主进风巷联络巷之间设立常开风门, 进回风巷联络巷之间设立闭锁风门; 灾变时通过远程控制常开风门关闭, 闭锁风门打开, 阻止烟流进入采区人员集中的地点而将其导入回风巷. 建立数学物理模型, 利用火灾动态模拟软件FDS进行数值模拟, 对比启动应急救援系统前后的火灾烟流运动路径变化; 模拟点火源与线火源条件下, 火灾蔓延、烟流运动及温度分布规律, 以指导地面对井下烟流的监测与控制, 证明应急救援系统的实用性和可行性。

关键词: 外因火灾; 应急救援系统; 数值模拟; 烟流控制; 风门

Numerical simulation and application research of mine fire emergency rescue system

Abstract:

In order to cope with the fire disaster in the main ventilation roadway, researched into plume dispersion in the ventilation system after belt and electrical apparatus fire in the intake airflow roadway. Mine fire emergency rescue system was established, through preinstalling many groups of remote monitoring air doors, in the crossheading between two main intake airflow roadways set up normally open air door, and set up blocking air door between the intake and return airflow roadway. During the disaster through remote monitoring to close the normal open air door and open the blocking air door, so as to prevent smoke from the working area, but import it into return airflow roadway. Established mathematical-physical model using fire dynamic simulation software of FDS to simulate and contrast the change of the smoke flow movement path before and after starting emergency rescue system. Under the conditions of point and line fire, simulated fire spread, smoke movement and temperature distribution, in order to guide ground to monitor and control the smoke underground, and prove the feasibility and practicality of emergency rescue system.

Keywords: external fire; emergency rescue system; numerical simulation; smoke control; air door

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