

论文

大断面全岩巷综掘工作面泡沫降尘技术

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摘要:

为了解决大断面全岩巷综掘工作面高浓度粉尘问题, 结合大断面岩巷综掘工作面产尘特点, 在对大断面岩巷综掘工作面综掘机截割破岩的过程分析后, 利用Fluent软件, 对大断面岩巷综掘工作面粉尘运动场进行数值模拟, 并分析了粉尘运动规律及粉尘浓度分布情况, 依据泡沫降尘原理, 设计了大断面岩巷综掘工作面泡沫降尘工艺系统, 并在淮北朱仙庄煤矿北翼胶带运输大巷大断面岩巷综掘工作面进行了现场应用。结果表明, 综掘岩尘主要集中在综掘工作面回风侧, 在尘源下风向的某一回风侧浓度达到最大; 泡沫降尘工艺系统制备的泡沫能包裹综掘机截割头, 覆盖岩壁达到提前润湿岩体, 减少和抑制粉尘的产生, 同时又能阻断已产生粉尘的扩散通道, 对全尘和呼吸性粉尘的平均降尘效率分别为86.2%和84.4%, 是水喷雾降尘效率的3.6倍和4.6倍, 取得了理想的降尘效果。

关键词: 大断面; 岩巷; 综掘工作面; 泡沫; 降尘

The technology of controlling dust with foam for fully mechanized excavation face of large cross-section rock tunnel

Abstract:

To solve the problem of high dust concentration caused by rock tunnel excavation, in view of the characteristics of dust produced and analyzing the processes of roadheader cutting rock, the paper used Fluent software to carry on numerical simulation of dust movement and analyse the dust characteristics of motion and concentration distribution. Simultaneously, this paper designed the foam dust suppression system applied to fully mechanize large cross-section rock tunnel excavation on the principle of foam dust suppression, and put it into application at the driving face of the north main haulage roadway in Zhuxianzhuang Coal Mine, Huaibei Mining Co., Ltd. The results show that the dust concentration on the exhaust section of the driving face, reaches a maximum at the leeward side of dust source. Foam making by the foam dust suppression system can enclose roadheader's cutting head and cover palisades, reaching the results of wetting rock, reducing dust content, depressing the generation of dust and blocking the spreading alleyway. The average dust-settling effect is 86.2% and 84.4% for the total dust and respirable dust, and the effect is 3.6 and 4.6 times comparing with water spray, achieving a good effect.

Keywords: large cross-section; rock roadway; comprehensive excavation face; foam; dust control

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