

Study on coordinated control and intelligent regulation for the disaster smoke flow in coal mines

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Abstract: After a disaster occurred in a coal mine, the serious deaths were caused by the smoke flow. In order to control the smoke flow during a disaster in coal mines, the distributed facilities were pre-installed in the key branches in the ventilation network, the project for coordinated control during the emergency rescue was put forward. The smoke flow control effects of distributed modular facilities in different scenarios were studied, and a collaborative optimal method to install the ventilation facilities was proposed. A new type of ventilation facility with fire prevention, adjustable for the roadway deformation and continuous regulation for the section of the roadway was developed. The key components of spare high pressure gas cylinder and battery were adopted after power outages, and the double insurance was realized by the automatic switching technology. The coordinated control and intelligent regulation system was controlled by remote instruction through the ground under normal condition. Multiple factors of cross-perception technology was developed, such as the communication state, temperature, smoke, the concentration of the CO, O₂, CO₂ and other gases, and the situation of a disaster was judged under the condition of abnormal communication interrupt. By decision tree learning method, a tree model of multiple factors was established, and through the data mining and multiple factors of cross-analysis. Based on the judges, the coordinated control and intelligent regulation system makes independent decisions.

Key words: disaster smoke flow; coordinated control; intelligent regulation; ventilation network; independent decision