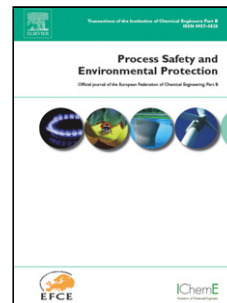


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Title: Assessment of Air Dispersion Characteristic in Underground Mine Ventilation: Field Measurement and Numerical Evaluation

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Abstract:

The environmental safety of an underground mine strongly depends on its ventilation system. An efficient ventilation system provides fresh air, removes hazardous gasses or dust, and maintains temperature and humidity in appropriate levels. One of the most important factors in removing hazardous gasses or dust is the dispersion behaviour in the mine network. This factor determines the longitudinal spreading and the average air residence time of gasses or particulate matters throughout the mine. This paper describes tracer gas measurement in an underground mine and its utilization and analyse the dispersion characteristic by using numerical simulations. The concentration-time curve obtained from the measurement is simulated to evaluate the effective diffusion coefficient which reflects the general dispersion characteristic of an entire mine. The evaluated values of effective diffusion coefficient are then compared to other data from several studies. The diffusivities obtained in this study have been found to be higher than other analytical and empirical results. More research is still required to identify the main factors causing such higher diffusivities; however the results from the present work can be an important standpoint for future works. In addition, numerical simulation conducted in this research confirmed to be effective in detecting several leakage paths occurred in the mine ventilation network.

Keywords: Tracer Gas, Underground Mine Ventilation, Dispersion, Numerical Simulation

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