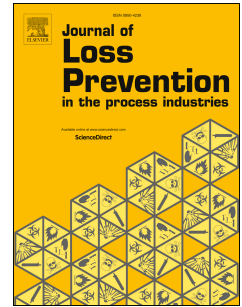


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Estimation of gas release and dispersion in coal mine based on Ensemble Kalman Filter

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1 Estimation of gas release and dispersion in coal mine based on 2 Ensemble Kalman Filter

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9 **Abstract:** Gas release caused by drainage pipeline failure or abnormal gas effuse at
10 mining area really threatens coalmine safety. The currently-used coalmine gas
11 monitoring and control techniques have difficulty in effectively obtaining real-time
12 gas concentration distribution and estimating gas emission rate in case of coalmine
13 gas release accident. In this paper, a numerical model based on advection-diffusion
14 equation combined with Ensemble Kalman Filter (EnKF) was proposed to estimate
15 coalmine gas release and dispersion. The proposed model was validated by twin
16 experiment, and the sensitivity analysis of first-guess gas release rate is conducted to
17 further demonstrate the feasibility of the proposed model. The reasonable results
18 indicate that the integration of advection-diffusion simulation and EnKF technique is
19 an effective tool for predicting real-time methane concentration distribution and
20 estimating gas emission rate in case of coalmine gas release accident, and also for
21 optimizing the layout and number of methane detectors in coalmine roadway. This
22 study could be helpful for providing technical supports for emergency response and
23 loss prevention in case of coalmine gas release incident.

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