MULTIPARAMETRIC ASSESSMENT OF GAS AND ROCK OUTBURSTS HAZARD IN HARD COAL MINE ROADWAYS IN THE SOUTH-WESTERN PART OF THE UPPER SILESIAN COAL BASIN

ABSTRACT

The doctoral dissertation is focused on an issue regarding risk assessment of gas and rock outbursts in the coal seams at the Upper Silesian Coal Basin. The aim of this work is to improve the method of estimating the state of gas-geodynamic hazard. For this purpose, at first, the problems related to the currently used methodology for both coal mine roadways and longwall workings were discussed. Then, an extensive database from various sources including: literature, conducted research on gas-geodynamic phenomena, as well as author's calculations and considerations was used to perform in situ measurements, analytical calculations, computer simulations and statistical analysis.

Due to the complexity and variety of gas-geodynamic phenomena, a methodology for assessing the state of hazard in longwall workings, proving the marginal level of risk was developed and implemented. The hazard status was assessed by analysing the seam degassing state in front of the longwall face, based on the in situ tests and the Zm index characterizing the kinematics of methane in the coal seam.

In case of considering the issues related to the state of hazard in the coal mine roadways, numerical modeling and statistical analysis were caried out, taking selected parameters into account to assess the state of gas-geodynamic hazard. Number of variant simulations considering the impact of factors such as: the depth of exploitation, the thickness of the seam or the compressive strength of coal were performed in the RS3 program. Using the Statistica program, the formula for the predicted methane desorption intensity index was determined and compared with the empirical results. Based on the conducted analyses, the variability of the measured desorption index was found at the level of 70.4%. A substantive discussion of the obtained results, as well as the developed methodology, may become the basis for further work on improving the accuracy of the assessment of the status of gas-geodynamic hazard.