

IMPROVING EFFICIENCY OF INFORMATION MEASUREMENT SYSTEM OF COAL MINE AIR GAS PROTECTION

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ПІДВИЩЕННЯ ЕФЕКТИВНОСТІ ІНФОРМАЦІЙНО- ВИМІРЮВАЛЬНОЇ СИСТЕМИ АЕРОГАЗОВОГО ЗАХИСТУ ВУГІЛЬНИХ ШАХТ

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ABSTRACT

Purpose. Development of scientific approaches to creation of high-precision and high-speed optoelectronic measurement systems within the complex of air gas safety of coal mines by means of the developed and implemented methods and means of measurement systems efficiency improvement taking into account compensation of the effect of destabilizing factors.

Methods. Experimental studies have been carried out in mine production conditions and laboratories on the physical models of information measurement systems using metrologically certified measuring instruments.

Findings. It has been proposed to determine the efficiency of the developed information and measurement systems on the basis of the arithmetic mean of n groups and the geometric mean of the information data rate of m meters measuring mine atmosphere parameters in coal mines for each group separately. It has been found that the use of the developed information system measuring methane and dust concentration within the UTSSC increases data rate of mine air gas protection system by 16.5 bits/s.

Originality. For the first time, logical design of information and measurement system of methane and dust concentration has been proposed and implemented, which, in contrast to the existing ones, is based on increasing accuracy and speed of measuring channels response to methane and dust concentration, which allowed to increase probability of detecting explosive situations from 0.90 to 0.98 and provide enhancement of mine air gas protection.

Practical implications. The developed methods and techniques allowed to implement a number of projects for the mining industry: high-speed measurement system evaluating methane concentration in a mine complex of monitoring telephone communication and notification “SAT” (private company “Deyta Express”, Ukraine); measurement system of polydisperse dust concentration for unified telecommunication systems of supervisory control and automated management of mining machines and technological complexes “UTSSC” (State Enterprise “Petrovsky Plant of Mining Machinery”, Ukraine).

Keywords: *measurement system, concentration, methane, dust, coal mine, accuracy, speed of response*