

Abstract

**IMPACT OF THE INITIATION ACCURACY OF THE EXPLOSIVES
CHARGE TO THE INDUCED PARASEISMIC VIBRATION**

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The use of modern initiation systems, which takes place in recent years, creates new opportunities for using blasting techniques in the new areas of mining activity. Innovative electronic detonators, which allow the initiation of blastholes with very high accuracy and a wide range of delays, can be used in blasting operations that are part of the rockbursts active preventive methods. Achieved accuracy and repeatability of the sequence of delays, brings the ability to control the level as well as the characteristics of generated paraseismic vibrations, and thus creates conditions for inducing similar and repetitive seismic effects.

The aim of the PhD thesis was to evaluate the possibility of inducing paraseismic waves characterized similar and repetitive frequency distributions using electronic initiation systems. The assessment was based on a broad analysis of seismic vibrations in the frequency and time-frequency domain. The analyzed vibration velocities were recorded during blasting operations carried out using electronic detonators in two independent places. In the first case, they were blasting works carried out in the KGHM mine, while in the second one they were blasting works related to the construction of the tunnel in Scandinavia.

The applied measurement systems recorded the vibration velocity of generated vibrations. In the collected and analyzed data looked for characteristic components with predicted frequencies based on the assumption that they depend on the time intervals between firing individual blastholes. Thanks to the exact and repeatable time sequence performed during blasting test, several series of holes were selected, which were fired in equal time intervals, characteristic for a given series. Then, for these series, spectra and spectrograms were determined in which components with expected frequencies were searched.

As a result of the analysis, it was found that in the vibration spectra recorded during blasting tests, there were found clear signal components with predicted frequencies and their harmonics. This shows that there are real possibilities to shape the frequency distribution of the induced paraseismic wave by detonating individual charges of explosives in the blastholes with fixed time intervals. This phenomenon can be used to improve the efficiency of the rockburst preventive active methods as well as in the protection of technical infrastructure facilities being exposed to paraseismic vibrations.