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Prediction of Rockburst Probability Given Seismic Energy and Factors Defined by the Expert Method of Hazard Evaluation (MRG)

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A b s t r a c t

In this paper we suggest that conditional estimator/predictor of rockburst probability (and rockburst hazard, $P^T(t)$) can be approximated with the formula $P^T(t) = P_1(\theta_1) \cdots P_N(\theta_N) \cdot P^T_{\text{dyn}}(t)$, where $P^T_{\text{dyn}}(t)$ is a time-dependent probability of rockburst given only the predicted seismic energy parameters, while $P_i(\theta_i)$ are amplifying coefficients due to local geologic and mining conditions, as defined by the Expert Method of (rockburst) Hazard Evaluation (MRG) known in the Polish mining industry. All the elements of the formula are (approximately) calculable (on-line) and the resulting P^T value satisfies inequalities $0 \le P^T(t) \le 1$. As a result, the ***hazard space*** (0-1) can be always divided into smaller subspaces (*e.g.*, 0-10^{-5}, 10^{-5}-10^{-4}, 10^{-4}-10^{-3}, 10^{-3}-1), possibly named with symbols (*e.g.*, A, B, C, D, …) called "hazard states" – which saves the prediction users from worrying of probabilities. The estimator P^T can be interpreted as a formal statement of (reformulated) Comprehensive Method of Rockburst State of Hazard Evaluation, well known in Polish mining industry. The estimator P^T is natural, logically consistent and physically interpretable. Due to full formalization, it can be easily generalized, incorporating relevant information from other sources/methods.

Key words: rockburst, rockburst hazard, hazard evaluation.