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Predictive assessment of the parting rocks weakening areas under the joint and downward mining of coal seams

Abstract

The article presents the results of underground investigations and by means of finite element method (FEM) the degree of geomechanics factors influence on the parting rocks stability and on the formation of troublesome zones of their weakening in underlying seam mining period.

The methodology for carrying out of computational experiments comprised three stages of consequent detection and account of structural transformations of parting rocks: preparation of extraction panel on the overlying coal seam, its mining with simultaneous extraction drifts operation on the underlying seam and consequent coal-face works on it.

The FEM research results analysis has been performed upon the developed criteria and algorithm for comprehensive assessment of the parting rocks stability with account of their tension stresses $\sigma_{y,z,x} \geq 0$ in three directions (Y , Z , X) of each lithotype occurrence in space. This takes into consideration the impact of factors of fracturing, water saturation and rheology. Therewith, the relation between sizes of parting rocks discontinuity areas and main influential factors have been obtained in the graphs families form.

The forecasting technique of the troublesome zones lengthwise extraction panel has been developed.

The technique, results of underground investigations and resource-saving system of fastening in reused extraction workings are presented.