



Influence of reconstruction water-bearing levels on surface displacement of post-mining areas

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The phenomenon of secondary deformation characteristic of the post-mining areas is not sufficiently recognized. For ground surfaces phenomenon may be continuous or discontinuous. There is no sufficient information that describes behavior of the rock mass in the long term after end of exploitation. It is considered that this phenomenon is gradually disappears with end of exploitation. Reliable quantitative data comes only from the analysis of direct measurements in selected areas: geodetic and satellites measurements. Analyzing current situation of operating mines can be said that in the near years, more centers will limit the mining of coal mining. This will contribute to separation further of post-mining areas, in which will be required to maintaining a permanent monitoring and making predictions on the impact of ended exploitation of the rock mass surface. This will be particularly important for highly urbanized areas.

This study used finite element method (FEM) to describe phenomenon of reconstruction water-bearing levels and its impact on displacement on the ground surface. It was assumed that significant factors that influence the occurrence and size of secondary deformations are: reconstruction of water-bearing levels in the prior drainer rock mass, size of past exploitation, spatial distribution of coal seams and geological and tectonic structure has been assumed. The transversally isotropic model of six elastic constants: $E_1 = E_2$, E_3 , $\nu = \nu_{12}$, ν_{13} , G_{12} , G_{13} has been assumed to describe of rock mass in the numerical calculations. Geometrical models used in the numerical calculations have been developed using GIS tools. For the study two-dimensional and three-dimensional models characterized by different geological conditions and different configuration of mining data have been developed. The results obtained displacements of the ground surface for the period of mining activity has been verified with the results based on the Knothe theory.

The results of analysis showed that during end of mining may claim to secondary deformations, significant in terms of surface displacement (subsidence or uplift of surface). It was also shown heterogeneous structure of the rock mass significantly affects the size and scope of surface displacement.