

Hydraulic fracturing in mining. Protection of a degassing well in a coal seam from air infiltration through the rock mass

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The paper discusses the application of the hydraulic fracturing (HF) to solve different problems during solid minerals development. Mine modification of the method is widely used in the following cases: a) determining the stress state of the rock massif; b) weakening of roof rocks for its controlled collapse; c) an increase in methane recovery of coal seams due to unloading and the formation of additional filtration paths; d) creation of protective impermeable screens filled with hardening compounds and located close to the underground workings.

For each of the identified tasks, the ways to improve the efficiency of the method and the features of the implementation of HF in underground conditions are considered. It is shown that using the equation $P_s = \sigma_{\min}$ for the test's results processing leads to overestimated values of the minimum stress acting in the rock mass. A technique for creating transverse cracks that does not require energy consuming cutting of the initiating slot on the borehole wall is considered. It allows, among other things, to increase the efficiency of the controlled roof collapse. A method and technical solutions for its implementation for sealing a given interval of an open hole with a significant change in its cross-section which is typical of coal seams are proposed. In this case, instead of widespread inflatable packers, impermeable bridges are used that are created immediately prior to the fracturing operation using fast-hardening polymer compositions.

Particular attention is paid to the actual problem of underground workings protection from filtering liquids and gases [1]. The developed approaches based on the separate injection of multicomponent compositions in the created fracture allow to solve the problem of mine air filtering into the gas extraction zone of a degassing well. This is achieved by forming an impermeable screen and increasing the concentration of methane in the pumped mixture [2].

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References

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