Numerical Simulation of the Failure Localization for Rock Massive Under Rock Pressure Conditions During Explosive Mining with Charges of Industrial Explosives

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Abstract. The complication of geomechanical conditions with an increase in the depth of field development requires improved calculations of drilling and blasting parameters based on studies of the patterns of changes in the stress-strain state and fragmentation of the blasted massif with an increase in rock pressure in various directions. This paper presents the results of studies of a section of a rock mass with a bare surface under conditions of flat deformation by the smoothed-particle hydrodynamics (SPH) method when blasting blasthole charges of sparing and crushing action. Regularities of change in time and space of the destruction zones of the massif and stresses with the formation of cracks as a result of the impact of an explosion in the presence of external pressure and in its absence are established. The results of calculations of the influence of physical and mechanical properties on the trigger effect of the destruction of the blasted rock are presented. To obtain preliminary estimates of the growth and branching of crack-like defects in real rocks under plane deformation conditions, numerical experiments were carried out. Diffraction patterns of fracture development on cracks filled with sand are obtained.

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