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Numerical modeling of stress and elastic wave velocities during formation of rapture within rocks

N.I. Diaur, J.L. Rebetsky, A.V. Mikhaylova, V.A. Terentiev, V.A. Lutsky and R.A. Lementueva

Schmidt Institute of Physics of the Earth, Russian Academy of Sciences, Russia, Moscow (diaur@ifz.ru) / +7 (095)2542865

There are presented outcomes of both, numerical modeling and laboratory studies of elastic wave velocities (Vp) simultaneously with strain measurement within carbonate samples. The numerical modeling of stresses distribution in investigated model samples have been performed until rapture and then after first crack formation by means of software tools UWAY. As a result is described a three-dimensional stress field including principal normal and shearing stresses. Especially coefficient of Lode-Nodai of strained state has been studied. The experiments on research of development of breaks and evolution of rupture at zones of heterogeneous tension of samples are carried out. The dimensions of the rock samples was 150·50·50 mm overall in general. A strain-gauge data of multichannel sampling for dolomite marble experiments demonstrate that an evolution of strains and advance of rupture under tensile stresses was occurred more viscous than for samples of marly calcite limestone. An experimental investigations of rupture forming by means of ultrasonic sounding between two stress sources allow to discriminate the zones of increase and decrease velocities of elastic waves and typical differences connected rock composition. Within rocks, where the progress of break at tensile stress occurs is more viscous there are large changes of velocities of elastic waves. If the fast brittle rupture was developed, these nonlinear processes of deformation of the rocks have been shown in a much narrower interval of time before rapture, and accordingly considerably velocities of elastic waves changed less.. As a result of analysis and generalization of experiments of brittle rapture of inhomogeneous loaded rock samples has been selected a stage of microstructural reorganization during that is a formation of the ordered structure of microcracks in the

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