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Performing numerical experiment of loading of rock core sample with plastic inclusions

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The presentation is devoted to the application of algorithms of finite element method (FEM) for modelling the laboratory test of uniaxial compression of elastic rock material with plastic inclusions. Considered the model of elastic rock with circle elastoplastic inclusions, which could be kerogen. The main aim of the presented work is estimation of effective elastoplastic properties of the rock. Calculations were performed on CAE Fidesys software, which implements finite elements methods with unstructured mesh, which allows to discretize curved boundaries of inclusions with high resolution. Inclusions are presented as uniformly distributed circles or ellipses with different orientation and ratio of semiaxes, what allows to take into account anisotropy of mechanical properties in rocks. Verification was performed with results of calculations of analytical models and movable cellular automata algorithm on examples of homogeneous elastic rock material with empty pores. Performed investigation of properties dependence from forms and orientations of inclusions. Also considered variants of elastoplastic matrix and elastic inclusions, and porosity in kerogen material.