



Application of the damage mechanics to the description of multiple cracks development in shales

Oleg Izvekov

Applied Mechanics Department, Moscow Institute of Physics and Technology, Russian Federation (izvekov_o@inbox.ru)

Oil and gas shales are one of the most perspective sources of hydrocarbons. Damage processes are in the focus of any technology of oil shales development because of their extremely low permeability. As a rule the aim of stimulation treatments is to make a system of multiple cracks. Real rock masses are almost heterogeneous. Strength of layered rocks like shales has anisotropic properties. Damage mechanics gives one of the natural ways of description of multiple cracks development. The phenomenological model of multiple cracks evolution in porous media based on general principles of thermodynamics [Kondaurov V.I., Izvekov O.Y., 2009] was generalized to the case of layered rocks. This model takes into account elastic domain existence, dependency of elastic domain on orientation of axis of anisotropy, reduction of elasticity modulus in active process, permeability and porosity change. The model involves latent energy of damage and elastic energy release due to damage evolution. In the report some coupled problems of damage and filtration are discussed.

This work was supported by Russian President Grant for Young Scientists MK-7249.2013.5.

Kondaurov V.I., Izvekov O.Y. A Model of Saturated Porous Media with an Elastic Brittle Skeleton // Proc. of the 4-th Biot Conference on Poromechanics, POROMECHANICS IV. – EStech Publications, Inc., PA,USA, 2009.