On fracture waves in saturated double porosity medium

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Phenomenological model describing coupled processes of fluid flow in fracture system, mass exchange between matrix and fractures, deformation of the skeleton and damage of the matrix is presented. The model is consistent with the fundamental conservation laws and the second law of thermodynamics.
The linearized model contains a large number of empirical parameters. In a particular one-dimensional case, the model is reduced to a simpler model with fewer parameters. This allows predicting the damage zone and fluid rate (debit from infinite crack at constant depression) behavior.
An initial-boundary-value problem is formulated and solved numerically, which simulates coupled processes of fluid flow, fracture and changes in the stress-strain state in a loaded half-space with double porosity, which was initially in equilibrium under abnormally high pore pressure. Problem formulation corresponds instantaneous decrease of pore pressure at the boundary of the half-space. The solutions have the form of destruction and depression wave. At early time period the fluid rate demonstrates high values close to constant or even increasing in time which depends on parameters values.
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