Mathematical model for the thermo and poroelasticity problems in fractured porous media

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Аннотация

In this work, we consider thermo and poroelasticity problems in fractured porous media. Mathematical models are described by the coupled system of equations for temperature (pressure) and discplacements [1]. For the fractured media, we can consider two cases: (1) high conductive fractures and (2) low conductive fractures [2]. For the first case with highly conductive fracture, we can use DFN model for weak discontinuity of the solution, and for second case with low conductive fractures, we obtain model with strong discontinuity of the tenperature or pressure. For discplacements, we also have strong discontinuity and set interface condition on the fractures. For small scale fractures in poroelastic model, we use dual porosity model, and for the thermoelasticity problems, dual continuum approach can be used for the heat transfer in porous media [3]. We consider two types of the fractures: (1) connected fracture network and (2) unconnected small fractures. For unconnected fractures, we can use numerical homogenization techniques and compute effective properties of the media for solution system on the coarse grid [4]. For a connected fracture network, numerical homogenization describes with error a large-scale scale model, so multiscale methods can be used. [5, 6].

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