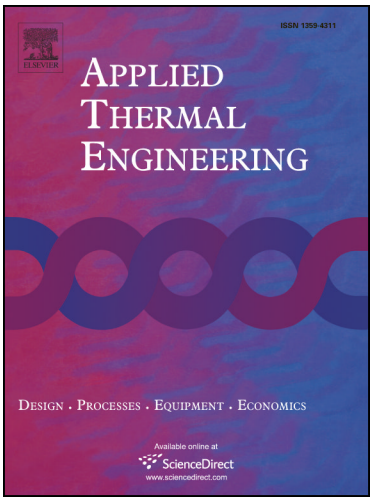

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The Simulation of Thermo-hydro-chemical Coupled Heat Extraction Process in Fractured Geothermal Reservoir

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Abstract

Chemical reaction effect is a critical issue in the heat extraction process of a fractured geothermal reservoir. In this study, the thermo-hydro-chemical coupled condition is simulated based on a unified pipe-network method (UPM) by considering interconnected fracture networks embedded in the rock mass. The chemical reaction kinetics of silica precipitation and dissolution is incorporated to capture and examine the effects of the silica-water interaction on the evolution of fracture apertures. The chemical influenced heat transfer between solid and fluid phases in the fractured porous media is characterized by a local thermal non-equilibrium (LTNE) model introduced based on two energy balance equations. A pipe equivalent technique is used to discretize the multiphysical coupled equations and unify the fracture-matrix information at the interface through the superposition principle in the UPM framework. Convergence tests are performed to verify the proposed model with one large fracture embedded in a doublet system for geothermal development.

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