

Mechanical and Hydraulic Characteristics of Rock Fracture Under Brittle-Ductile Transition

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A new concept of Enhanced Geothermal System (EGS), in which geothermal fluids are produced from a fractured reservoir created artificially within an originally semi-brittle or ductile basement, has been proposed. To assess the potential of the new geothermal system, the "Japan Beyond-Brittle Project (JBBP)" has also been recently initiated, and the author have conducted fundamental investigations on mechanical and hydraulic characteristics of the new type of reservoir, in which the rock is first experiences hydraulically and/or thermally induced brittle failure, and then subjected to the temperature and pressure conditions where the rock exhibits semi-brittle or ductile stress-strain behavior at the natural condition. Kawarago tuff have been used in the present study, because brittle, semi-brittle and ductile stress-stain behaviors of the tuff specimen can be controlled only with confining stress level at the room temperature. At confining stresses up to 40 MPa, tri-axial compression and fluid flow experiments have been conducted on the specimens without and with thermal fracture.

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