

# **Numerical thermo-elastic simulation for change in fracture aperture associated with cold fluid injection**

Kosuke Kaneta, Yusuke Mukuhira, Takatoshi Ito

Institute of Fluid Science, Tohoku University (Japan)

**Keywords:** Reinjection, thermal contraction, fracture, aperture, geothermal reservoir

## **Abstract**

We analyzed the effect of thermal contraction of rock on fracture permeability. The analysis was carried out by using a 2D FEM code which can treat the coupled problem of fluid flow in fractures, elastic and thermal deformation of rock and heat transfer. We assumed a single fracture in a high-temperature rock mass subjected to a uniform confining stresses. Under the conditions, low-temperature fluid was injected into the fracture. The results of simulation showed that even under confining environment, the considerable increase in fracture permeability appeared due to thermal deformation of rock, which should be caused by the difference between the initial temperature of rock and the fluid temperature. However, for the increase of fracture permeability, the temperature difference was necessary to be larger than a critical value, and the critical value increased with the magnitude of confining stress.