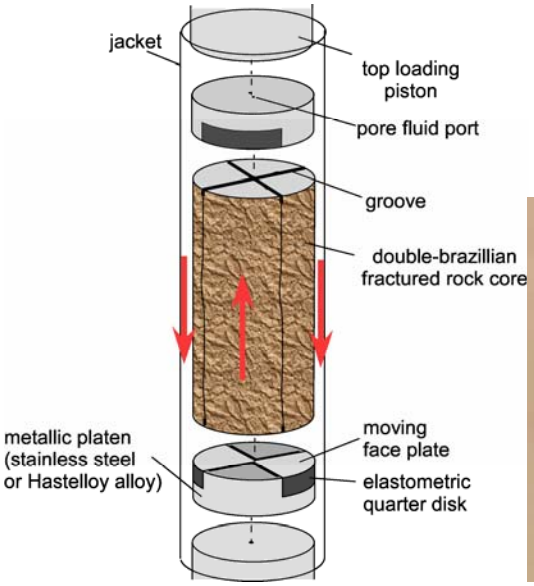
COUPLED THERMAL-HYDROLOGICAL-MECHANICAL-CHEMICAL MODEL AND EXPERIMENTS FOR OPTIMIZATION OF ENHANCED GEOTHERMAL SYSTEM DEVELOPMENT AND PRODUCTION

Eric Sonnenthal, Jonny Rutqvist, and Seiji Nakagawa

Stimulation and production of a geothermal reservoir is a strong perturbation to the local physical and chemical environment which gives rise to coupled Thermal-Hydrological-Mechanical-Chemical (THMC) processes, particularly manifested in the opening and sealing of fractures. The primary objectives of the proposed research are to (1) Develop a novel model and high-performance code for analysis of coupled THMC processes in EGS, (2) Understand quantitatively the permeability of sheared fractures and its long-term changes through coupled THMC processes, via laboratory experiments and joint modeling, (3) Refine and validate the models and code to laboratory experiments using chemical, isotopic, physical, hydrological, and geophysical measurements, and (4) Model coupled THMC processes in the near-wellbore hydrofracture system jointly with the large-scale THMC behavior for a case study EGS.