Abstract

Developing improved methods to better characterize fractures in Enhanced Geothermal System (EGS), new methodologies to characterize geothermal reservoir northwest part of the Geysers, and gain better knowledge of their porosity, permeability, fracture size, fracture spacing and reservoir discontinuities (faults and shear zones) is the main objective of our research team. This will be accomplished by creating a 3-D seismic velocity model of the field using the microseismic data. Exploiting the anisotropic and fractal nature of the rocks gives better understanding the fracturing system. In addition soft computing is used for processing and analyzing the passive data.

Predicting characteristics of fractures and their orientation prior to drilling new wells, also determining location of fractures, spacing and orientation during drilling, as well as characterizing open fractures after simulation help identify the location of fluid flow pathway within the EGS reservoir.. These systems are created by injecting water, and stimulating fracture development in hot wet rocks, and hot dry rocks. The fractures thus created enhance the permeability of the hot rock formations, thus enabling better circulation of water for the purpose of producing the geothermal resource. Better understanding the mechanisms for fracture stimulation can be used to obtain more information for a better exploitation of geothermal resources of the Geysers field (Sonoma County, California) and other similar fields.

Micro-seismic data analysis both for compressional waves and shear wave using soft computing, anisotropic inversion and fractals can be used to develop and test new data collection analysis techniques. This enables us to analyze and interpret micro-seismic data and create velocity fields using tomography. Neuro-fuzzy approach can be used to create a hybrid MEQ event picking.