Geophysical Research Abstracts
Vol. 19, EGU2017-2892, 2017
EGU General Assembly 2017

Effect of fracture size distribution on block hydraulic behaviors of the stochastic 2-D DFN system

Dahye Lee, Jisu Han, Jeong-Gi Um, and Sookyun Wang

Pukyong National University, Department of Energy Resources Engineering, Busan, Korea, Republic Of (diekek44@naver.com)

Fracture geometry parameters such as orientation, density and size play an important role in the hydraulic behavior of fractured rock masses. In this study, the two dimensional steady-state fluid flow through discrete fractured geologic media with various fracture size is addressed to examine the effect of fracture size distribution on the hydraulic characteristics of fractured rock masses based on numerical experiments. Total of 720 stochastic 2-D DFN(descrete fracture network) systems are generate using two fracture sets with fixed input parameters of fracture orientation and density, and various fracture size distribution condition. The DFN systems were prepared into three groups in which the intersection angles between the two strikes of the two fracture sets are 30, 60 and 90 degrees, respectively. Each group has four sub-groups having different fracture size distributions and deterministic densities. The directional block conductivity including the theoretical block conductivity, principal conductivity tensor and average block conductivity were estimated for generated 720 2-D DFN blocks. The results obtained from this study show that the higher the mean and standard deviation of the fracture size, the greater the directional block conductivity. The connected flow path in the DFN system seems to increase with the increase of fracture size distribution. The chance for equivalent continuum behavior of the DFN system increase with increasing mean and standard deviation of fracture size. In the DFN system, even if the mean of the fracture sizes is the same, the size distribution can have a very significant effect on the hydraulic behaviors of the overall system as the standard deviation of the fracture sizes increases.