A geostatistical approach to estimating the parameters of a 3D Cox-Boolean discrete fracture network from 1D and 2D sampling observations

Hekmatnejad, Amin

Emery, Xavier

Elmo, Davide

 This work addresses the problem of parameter inference in the Cox-Boolean discrete fracture network model, in which the fractures are represented by flat discs with random orientations and diameters that are centered at the points of a doubly stochastic Poisson process or Cox process. Since the distributions of the fracture orientations and fracture diameters can be estimated from information of borehole and areal surveys, the focus is given to the distribution of the potential field of the Cox process, which measures the average number of fracture centers per unit volume. To this end, a relationship between the distributions of fracture diameter, fracture intensity (mean fractured surface per unit volume) and potential field over a large block support is established, and relationships between the moments of these distributions are derived. In practice, the moments of the fracture intensity at a point support can be inferred from borehole information and upscaled to