

1163-05-1373

Aric Hagberg* (hagberg@lanl.gov), **Jeffrey D Hyman**, **Dave Osthus**, **Shriram Srinivasan**, **Hari Viswanathan** and **Gowri Srinivasan**. *A bipartite graph model for backbone discovery in discrete fracture networks.*

We present a graph-based method to identify primary flow and transport subnetworks in three-dimensional discrete fracture networks (DFNs). We develop a bipartite graph representation as a course-scale representation of a DFN that integrates fracture network topology, fracture geometry, and hydraulic properties. The two most common graph-representations of DFNs, vertices representing intersections and vertices representing fractures, are projections of this bipartite graph thereby providing a generalization of existing modeling approaches. Primary subnetworks are identified by running a heuristic algorithm that determines the edge-disjoint shortest paths through the graph which correspond to the regions where the fastest transport occurs. Using the identified primary subnetworks computational estimates of first-passage times for transport can be computed an order of magnitude faster. (Received September 15, 2020)