Simulating Flow in Fracture Networks

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The aim of this Semester thesis is to investigate fluid flow in fracture networks. Generated anisotropic three-dimensional fracture networks, consisting of planar, irregular, n-polygonal fractures are thereby studied. A modified invasion percolation (MIP) is proposed to find critical leakage paths. The MIP allows the incorporation of the contact angles and the contact length between the connected fractures, fracture inclination of the entry fractures, and a constant gravitational field. To study leakage rates and pressure fields after percolation, the cubic law is solved for the remaining fracture network in the form of a linear system with a global system matrix which is composed of the fractures as elements and the connections as nodes.