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Particle tracking in a synthetic karst network at different stages of evolution

F. Gabrovsek
Karst Research Institute ZRC SAZU, Postojna, Slovenia (gabrovsek@zrc-sazu.si, +38 65700 1999)

Tracer transport through the karst aquifer is governed by many mechanisms which lead to a typical breakthrough curve. Among others, the simple possibility of many alternative pathways connecting the injection and sampling point could play an interesting role. To explore this, we applyed a model of 2D fracture network which allows simulation of its evolution by dissolution processes. With such model we produceed a set of networks at different stage of maturity and explored their transport properties by introducing a finite number of particles at a selected site and watch their appearance at other sites. We applyed particle tracking to simulate the transport within the network. Within each individual fracture the velocity was taken constant. At fracture intersections the particles were distributed into the outflowing fractures according to their flow rate. The input flow rate during the experiment was taken constant and no dispersion and sorption processes as well as exchange with the matrix was taken into account. The results demonstrate the concentration of tracer into the most succesfull pathways as the evolution proceeds. Interesting scenarios were observed on networks where alternative dissolution mechanisms, such as mixing corrosion, dominate.