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Interactive comment

Interactive comment on "Stochastic modeling of flow and conservative transport in threedimensional discrete fracture networks" *by* I.-Hsien Lee et al.

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We thank Reviewer #2 for the valuable comments to our manuscript. The following is the responses to the comments proposed by Reviewer #2.

Anonymous Referee #2 This is a very interesting topic, the efforts of the authors should be applauded by the community. The only concern i have is the practical application of this innovation. I am wondering if the authors can ïňĄnd experimental data to compare with their numerical calculations?

Response: Thanks for the positive comment. Laboratory experiments can provide data for simple fracture connections. There are existing gaps between DFN models and field verifications. For realistic sites, the main difficulty is the measurement technologies that can be used to quantify the detailed fracture distribution in a rock. The site-specific fracture distributions are typically obtained from scanline or window samplings applied to available outcrops. It is even more difficult to conduct flow and transport experiments at sites with realistic scale and complexity. Most field experiments might focus on the equivalent behavior of flow and transport in fractured rocks. Such results can be the observations for evaluating the concept of parameter upscaling in DFN models. We also discussed this issue in the study. There have been many numerical models proposed for DFN flow or transport simulations (i.e., Trinchero et al., 2016; Berrone et al., 2018; Fourno et al., 2019). Because of the limited technologies in measuring detailed flow and transport in a rock, the fracture statistics for rocks plays an important role in bridging the understanding between fracture distributions and flow and transport mechanisms. One can employ the fracture statistics to evaluate the possible flow paths or contaminant transport in fractured rocks. In this study, we used Monte Carlo Simulation (MCS) to quantify the influence of input uncertainty (i.e., the fracture intensity and distributions) on the output uncertainty. The insufficient data from sites were represented by the uncertainty and can used for risk assessments or engineering designs.

Berrone, S., Fidelibus, C., Pieraccini, S., Scialò, S., Vicini, F., 2018. Unsteady advection-diffusion simulations in complex Discrete Fracture Networks with an optimization approach. Journal of Hydrology 566, 332-345. Fourno, A., Ngo, T.-D., Noetinger, B., La Borderie, C., 2019. FraC: A new conforming mesh method for discrete fracture networks. Journal of Computational Physics 376, 713-732. Trinchero, P., Painter, S., Ebrahimi, H., Koskinen, L., Molinero, J., Selroos, J.-O., 2016. Modelling radionuclide transport in fractured media with a dynamic update of Kd values. Computers & Geosciences 86, 55-63.

Thank you for your time.

Chuen-Fa Ni

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