Contribution ID: **697** Type: **Poster (+) Presentation**

Dynamics of unsaturated flow in fracture networks: impact of local splitting behavior at the intersection

Thursday, 3 June 2021 14:40 (1 hour)

Understanding the physical mechanisms of unsaturated flow in fractured vadose zone at different scales is an important for subsurface hydrology. Here we develop a network model to study infiltration in unsaturated fracture networks. We consider an idealized fracture network composed of a series of Y-shaped intersections. At each intersection, liquid storage/release and splitting/convergence behaviors are modeled according to local splitting relationships obtained from detailed laboratory work and numerical simulations. By varying the splitting relationships, we systematically investigate the influence of local flow behaviors on large scale flow structures. We show that when the water tends to split equally at the intersection, a divergent flow structure forms in the network. Conversely, preferential pathways emerge in case of unequal splitting. We find that an avalanche infiltration mode, i.e., sudden release of a large amount of water from the network, emerges spontaneously. This flow mode is modulated by the local splitting behavior. The pathways of preferential flow is controlled by the liquid volume triggered by avalanches and the network structure.

Time Block Preference

Time Block B (14:00-17:00 CET)

References

Xue, S., Yang, Z., Hu, R., & Chen, Y. F. (2020). Splitting Dynamics of Liquid Slugs at a T-Junction. Water Resources Research, 56(8), e2020WR027730.
Yang, Z., Xue, S., Zheng, X., & Chen, Y. F. (2019). Partitioning dynamics of gravity-driven unsaturated flow through simple T-shaped fracture intersections. Water Resources Research, 55(8), 7130-7142.

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