



Contribution ID: 216

Type: Oral Presentation

Bifurcating-Paths: the relation between preferential flow bifurcations, void, and tortuosity on the Darcy scale.

Thursday, 2 June 2022 11:50 (15 minutes)

Darcy scale transport in porous media ranges between Fickian and non-Fickian according to the medium conductivity layout, which ranges between homogenous and heterogeneous. Yet, evidence shows that preferential flows that funnel and bypass even areas with high conductivity occur in heterogeneous and homogenous cases. We model the Darcy scale transport using a 2D conductivity field ranging from homogenous to heterogeneous and find that these preferential flow bifurcate, leaving voids where particles do not invade while forming a tortuous path. The fraction of bifurcations decreases downflow and reaches an asymptotical value, which scales as a power-law with the heterogeneity level. We show that the same power-law scaling holds for the void fraction, tortuosity, and fractal dimension analysis. We conclude that the scaling with the heterogeneity is the dominant feature in the preferential flow geometry, which will lead to variations in weighting times for the transport and eventually to anomalous transport.

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Country

Israel

References

Time Block Preference

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

Participation

Unsure

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Session Classification: MS23

Track Classification: (MS23) Special Session in honor of Brian Berkowitz