Contribution ID: **814** Type: **Oral Presentation**

Nonequilibrium and cooperative behavior in quasistatic fluid-fluid displacements underpin energy dissipation and hysteresis in the passage through constrictions

Wednesday, 24 May 2023 15:15 (15 minutes)

We examine the nonequilibrium nature of fluid displacement in heterogeneous media from a theoretical, numerical and experimental standpoint, using an imperfect Hele-Shaw cell featuring a localized extended constriction. We focus on the configurational energy dissipated in imbibition and drainage, and how it relates to the capillary pressure-saturation hysteresis cycle. Individual constrictions can be classified as weak (reversible) or strong (dissipative), depending on their cross-section gradient. We show however that cooperative effects can make displacements through a pair of weak defects dissipative, through spatial interactions mediated by interfacial tension; we identify the critical distance between the weak constrictions, below which irreversibility, dissipation, and hysteresis emerges.

Participation

In-Person

References

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Energy Transition Focused Abstracts

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