Contribution ID: **453** Type: **Oral Presentation**

Memory, energy dissipation and hysteresis of two-phase flows

Tuesday, 31 May 2022 11:45 (15 minutes)

Memory, hysteresis, and energy dissipation are related concepts that appear in nonequilibrium disordered systems, but the links between their microscopic origins and the resulting macroscopic properties remain elusive. Using the return-point memory of cyclic macroscopic trajectories, we formulate an accurate thermodynamic characterization of quasistatically-driven dissipative systems with multiple metastable states. We use this framework to quantify the energy dissipated in fluid-fluid displacements in disordered media. Our simulations highlight the importance of correlations between individual microscopic interfacial jumps, resulting in an overall collective hysteretic and dissipative behavior. This cooperative mechanism is absent from classical compartment models. Comparison to experiments provides interesting insights into the role of viscous dissipation in slowly driven systems.

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Time Block A (09:00-12:00 CET)

Participation

Unsure

Primary authors: Dr HOLTZMAN, Ran (Coventry University); DENTZ, Marco (IDAEA-CSIC); Dr PLANET, Ramon (University of Barcelona, Spain); ORTIN, Jordi (Universitat de Barcelona)

Presenter: Dr HOLTZMAN, Ran (Coventry University)

Session Classification: MS09

Track Classification: (MS09) Pore-scale modelling