Contribution ID: **101** Type: **Oral Presentation**

Relating oil-water two-phase flow pore-scale phenomenon to Darcy-scale constitutive relations

Tuesday, 20 May 2025 09:05 (15 minutes)

Multiphase flow in porous media on large (Darcy) scales is conventionally modelled by constitutive relations: relative permeability and capillary pressure functions. These are typically obtained experimentally and are specific for a given porous medium and flowing phases under certain conditions. The approach, although widely used, is still under scrutiny. One of the fundamental challenges of modeling is how to interpret these constitutive relations in terms of pore scale fluid phenomenon.
In this work we conducted an oil-water drainage experiment on a synthetic porous medium consisting of glass beads. The fluids and medium were visualized using confocal microscopy. We were able to characterize the saturation distribution in the porous medium both as a function of time at a specific location in the porous medium and throughout the entire medium at steady state conditions. We then characterized the constitutive relations by accurately matching a one-dimensional model to the transient results of the experiment. Insight is drawn regarding the relationship between the observed pore-scale flow and the resulting Darcy-scale relative permeability and capillary pressure functions.

Country

Israel

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

Water & Porous Media Focused Abstracts

References

Primary authors: RABINOVICH, Avinoam (Tel Aviv University); Mr BEN-SHABAT, Avidan (Tel Aviv University); Ms HE, Tianlei (Harvard University); Prof. WEITZ, David (Harvard University)

Presenter: RABINOVICH, Avinoam (Tel Aviv University)

Session Classification: MS06-B

Track Classification: (MS06-B) Interfacial phenomena across scales