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Contribution ID: **104**   Type: **Oral Presentation**

Pore-scale modelling and sensitivity analyses of hydrogen-brine multiphase flow in geological porous media

Friday, 4 June 2021 14:15 (15 minutes)

Supply of green energy to society can successfully happen if large-scale storage technologies are developed. Underground hydrogen storage (UHS) in initially brine-saturated deep porous rocks is a promising option, due to hydrogen's high specific energy capacity and the high volumetric capacity of aquifers.
Appropriate selection of a feasible and safe storage site vitally depends on understanding hydrogen transport characteristics in the subsurface. Unfortunately there exist no robust experimental analyses in the literature to properly characterise this complex process. As such, in this work, we present a systematic pore-scale modelling study to quantify the crucial reservoir-scale functions of relative permeability and capillary pressure and their dependencies on fluid and reservoir rock conditions. To conduct a conclusive study, in the absence of sufficient experimental data, a rigorous sensitivity analysis has been performed to quantify the impacts of uncertain fluid and rock properties on these upscaled functions. The parameters are varied around a base-case, which is obtained through matching to the existing experimental study. Moreover, cyclic hysteretic multiphase flow is also studied, which is a relevant aspect for cyclic hydrogen-brine energy storage projects. The present study applies pore-scale analysis to predict the flow of hydrogen in storage formations, and to quantify the sensitivity to the micro-scale characteristics of contact angle (i.e., wettability) and porous rock structure.

Time Block Preference

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

References

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Primary authors: Ms HASHEMI, Leila (Delft University of Technology); Prof. BLUNT, Martin J. (Imperial College London); Prof. HAJIBEYGI, Hadi (Delft University of Technology)

Presenter: Ms HASHEMI, Leila (Delft University of Technology)

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