Contribution ID: **586** Type: **Oral Presentation**

Hysteresis in Multiphase Flow and Application to Hydrogen Storage

Monday, 30 May 2022 11:35 (15 minutes)

Energy storage has been an area of interest for many decades. Underground storage is a way to store a huge amount of energy, but it has many challenges along with safety and economic impacts. Hydrogen storage in the subsurface can be considered as a long-term energy storage solution. Green hydrogen can be produced from the excess electricity during peak production, it can be injected into the surface reservoir and withdrawn for the time of high demand. The focus of this project is to understand the hysteresis phenomenon and study the behaviour of fluids in porous media, which can be applied to underground hydrogen storage processes. Two experiments were performed at an unsteady state to investigate the pore-scale observation during the cycle of drainage and imbibition steps. This work studied hydrogen and nitrogen injections at representative subsurface pressures and a wider range of hysteresis cycles, coupled with measurements of capillary pressure from interfacial curvature and relative permeability. This research utilises the advantages of using computed tomography on a micro-scale to image the dynamic behaviour of the flow through the sample. This technique helps to have a better understanding of multi-phase flow characterisation in porous media by providing three-dimensional images. The purpose of the work is to provide pore-scale insights into hydrogen storage and withdrawal while providing multiphase flow properties for input into the reservoir-scale simulation.

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References

Time Block Preference

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

Participation

In person

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Session Classification: MS10

Track Classification: (MS10) Advances in imaging porous media: techniques, software and case studies