Contribution ID: **293** Type: **Oral Presentation**

Darcy-Scale Image Analysis for laboratory CO2 storage and fracture flow

Wednesday, 15 May 2024 12:00 (15 minutes)

Imaging has always played a vital role in obtaining a better understanding of porous media processes through laboratory experiments. In contrast to pore-scale imaging, extracting Darcy-scale interpretation from porous media experiments has so far not drawn equally big attention. On the other hand, various imaging techniques used in the lab often do not offer pore-scale resolution, e.g., CT-PET, MRI, or optical images. Targeting the dedicated processing of image data from aforementioned sources in a unified way, a new software package has been developed to enable both qualitative and quantitative research based on experimental data: DarSIA (short for Darcy-Scale Image Analysis) [1]. It provides unified input capabilities for various data types as well as a range of preprocessing tools, upscaling routines, and multi-image comparison tools allow for direct comparison. To mention two examples, such include tools to e.g. quantify the pointwise mechanical deformation in terms of a displacement map; and measure the disparity between two fluid configurations in terms of Wasserstein metrics and associated optimal transportation maps. Moreover, DarSIA provides I/O for simulation data formats and thus conventiently allows for bridging computational and experimental research.

In this talk, we present the philosophy behind DarSIA, and showcase its application for two example studies:

1. the evaluation of optical image series of laboratory CO2 storage for the FluidFlower Validation Benchmark Study for the Storage of CO2 [2,3],
2. comparison of PET images of flow in fractured media against simulation data in the context of a validation study for mixed-dimensional modeling [4].

Acceptance of the Terms & Conditions

Click here to agree

Student Awards

Country

Norway

Porous Media & Biology Focused Abstracts

References

[1] JM Nordbotten, B Benali, JW Both, B Brattekås, E Storvik, MA Fernø, DarSIA: An open-source Python toolbox for two-scale image processing of dynamics in porous media, TiPM (2023) [2] MA Ferno, M Haugen, K Eikehaug, O Folkvord, B Benali, JW Both, E Storvik, CW Nixon, RL Gawthrope, JM Nordbotten, Room-scale CO2 injections in a physical reservoir model with faults, TiPM (2023) [3] B Flemisch, JM Nordbotten, M Fernø, R Juanes et al., The FluidFlower Validation Benchmark Study for the Storage of CO2, TiPM (2023) [4] JW Both, B Brattekås, M Fernø, E Keilegavlen, JM Nordbotten, High-fidelity experimental model verification for flow in fractured porous media, arXiv:2312.14842

Conference Proceedings

I am interested in having my paper published in the proceedings.

Primary author: BOTH, Jakub (University of Bergen)

Co-authors: FERNO, Martin (University of Bergen); NORDBOTTEN, Jan Martin; Dr STORVIK, Erlend (Western Norway University of Applied Sciences)

Presenter: NORDBOTTEN, Jan Martin

Session Classification: MS10

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