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Predictive Digital Rock Physics simulation applied on a Sandstone Reservoir

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Digital Rock Physics (DRP) simulation provides a fast and cheap way to compute relative permeability curves of a rock/fluids system. It represents an opportunity to provide more data to Reservoir engineers and thus help them to have better petrophysical input for their simulations. In a previous work, we have shown that DRP simulation was predictive for a mixed-wet Bentheimer when coupled with a wettability anchoring experiment (Regaieg et al 2022). In this work, we first apply TotalEnergies DRP simulation workflow in an operational context on Reservoir sandstone sample while coupling it with a wettability anchoring experiment. Images representing large volumes with low resolution are, first, improved with Enhanced Super Resolution Generative Adversarial Networks (ESRGAN) in order to obtain a large images with high resolution. Then, a pore network is extracted and TotalEnergies parallel pore network simulator is used for multiphase flow simulations taking into account the constraints from the anchoring experiment to include wettability information. Subsequently, we compare the results against an in-house SCAL experiment. This allows us to assess the predictive power of our DRP workflow on a sandstone Reservoir rock. After that, new simulations are performed using a new sample from the same facies without carrying out a new anchoring experiment. Finally, the simulation results are compared to a second in-house SCAL experiment and the extrapolation power of DRP simulation is assessed.

Participation

In-Person

References

Regaieg, M., Nono, F., Faisal, T. F., & Rivenq, R. (2022). Large Pore Network simulations coupled with innovative wettability anchoring experiment to predict relative permeability of a mixed-wet rock. Research Square. <https://doi.org/10.21203/rs.3.rs-1878809/v1>

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