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Fluid Flow Property Estimation Using a Pore Network Modeling Approach

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Pore network modeling is a technique that has been booming in recent years, and several authors have used it to obtain properties as absolute permeability, relative permeabilities and capillary pressures, which are common obtained from laboratory tests and/or experimental correlations. The scope of this work is to model flow and immiscible displacement and estimate fluid flow properties such as, absolute permeability and capillary pressure curve, using a systematic methodology. With this in mind, the workflow begins choosing an open access carbonate's micro-CT image and its extracted network. The digital sample is similar to a rock sample used in a primary drainage test. From the available information, a statistical analysis to explore the network's topological properties and the medium's geometric properties is performed. This analysis will allow us to identify and propose spatial dependencies between some properties of the network elements. Then, through multiple realizations, equivalent networks are generated using *OpenPNM*, an open source pore-network modeling project. Subsequently, to simulate flow and primary drainage same conditions as those of the laboratory test are taken into account. The Hagen-Poiseuille model and invasion percolation with trapping are considered, for flow and primary drainage respectively. In primary drainage process, statistically equivalent pore network realizations give rise to a family of capillary pressure curves that comprises a reliability window, i.e. a value range that capillary pressure can take for the medium under study. Finally, a capillary pressure model is fitted and the confidence intervals are validated.
This methodology is validated in a case of study for pore network modeling of a carbonate rock sample.

References

[1] Gostick, J. (2016). OpenPNM: A Pore Network Modeling Package. Computing in Science and Engineering, 18(4), 60-74. http://doi.org/10.1109/MCSE.2016.49

[2] Imperial College Consortium on Pore-scale Modelling (2014). Carbonate C2, [Online] https://doi.org/10.6084/m9.figshare.1189258.v1 [Retrieved: 11-30-2017].

[3] Martínez-Mendoza, E.G. (2016). Pore network models for obtaining effective flow and transport properties in petroleum reservoirs. (Bachelor thesis). Faculty of Engineering, Universidad Nacional Autónoma de México.

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