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## CAPILLARY DRIVEN MOBILITY CONTROL BY EMULSION INJECTION IN HETEROGENEOUS POROUS MEDIA

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Oil-water emulsion injection has shown significant potential as an Enhanced Oil Recovery (EOR) method. Experimental results revealed that drop size, drop concentration and local capillary number as the most relevant parameters affecting emulsion performance as water phase mobility control agent.

Emulsion injection in real reservoirs and production predictions requires a deep understanding of their flow at the pore scale and the underlying mechanisms responsible for the macroscopic improved oil recovery. Ponce et al. (2017) developed a macroscopic model to describe emulsions flow in porous media by relative permeability curves parametrization as a function of emulsion concentration and local capillary number.

In this work, we study water alternating emulsion injection (WAE) in a highly heterogeneous reservoir. Parametric analysis was performed in 2D and 3D simulations models to explore WAE performance regarding the time at which the emulsion is injected, the size of emulsion bank and the local capillary number. Results showed that WAE injection may attain an extra oil recovery up to 7% when compared to water injection.

### References

- [1] Ponce, R. V., Alvarado, V., Carvalho, M. S., Water-alternating-macro emulsion reservoir simulation through capillary-number dependent modeling, Submitted to Journal of the Brazilian Society of Mechanical Sciences and Engineering - March, 2017.
- [2] Guillen, V.R., Carvalho, M.S., Alvarado, V., Pore Scale and Macroscopic Displacement Mechanisms in Emulsion Flooding. *Transp. Porous Media* 94 (2012a) 197-206.
- [3] Romero, M.I., Carvalho, M.S., Alvarado, V., Experiments and network model of flow of oil-water emulsion in porous media. *Physical Review E* 84:046 (2011) 305.
- [4] Engelke, B., Carvalho, M.S., Alvarado, V., Conceptual Darcy-Scale Modelo os Oil Displacement with Macroemulsion, *Energy Fuels* 27 (2013) 1967-1973.
- [5] Cobos, S., Carvalho, M.S., Alvarado, V., Flow of oil-water emulsions through a constricted capillary. *Int. J. Multiphase Flow* 35 (2009) 507-515.
- [6] Guillen, V. Romero, M.I., Carvalho, M.S., Alvarado, V., Capillary-driven mobility control in macro emulsion flow in porous media. *Int. J. Multiphase Flow* 43 (2012b) 62-65.

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