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EM heating stimulated water flooding for oil recovery

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We report a study of heavy oil recovery by combined water flooding and electromagnetic (EM) heating at a frequency of 2.45 GHz used in domestic microwave ovens. A mathematical model describing this process was developed. Simplified model equations are solved analytically and the solution is presented in an integral form for the one dimensional case. Complete model is solved numerically using Finite Difference Schemes. Experiments consisting of water injection into Bentheimer sandstone cores, either fully water-saturated or containing a model heavy oil, were also conducted, with and without EM heating.

Model prediction was found to be in rather good agreement with an experiments indicating that EM heating induces an overall improvement of the mobility ratio between the displacing water and the displaced heavy oil.

References

Paz, P., Z., S., Hollmann, T., H., Kermen, E., Chapiro, G., Slob, E., Zitha, P., L., J., EM heating stimulated water flooding for medium-heavy oil recovery. Transport in Porous Media, V. 119, Issue 1, p. 57–75, 2017.

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