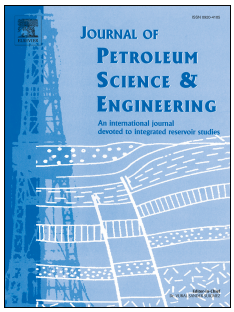
Accepted Manuscript



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PII: S0920-4105(16)31266-9

DOI: 10.1016/j.petrol.2017.09.059

Reference: PETROL 4302

To appear in: *Journal of Petroleum Science and Engineering*

Received Date: 14 December 2016

Revised Date: 29 April 2017

Accepted Date: 23 September 2017

Please cite this article as: Molla Davoudi, B., Assareh, M., Dehghani, M.R., Khoshnamvand, Y., An investigation on surfactant aided gravity drainage in fractured reservoirs using matrix block flow simulation, *Journal of Petroleum Science and Engineering* (2017), doi: 10.1016/j.petrol.2017.09.059.

An Investigation on Surfactant Aided Gravity Drainage in Fractured Reservoirs Using Matrix Block Flow Simulation

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Abstract

Capillary and gravity forces are the controlling mechanisms in fractured reservoirs recovery. Most of the fractured reservoirs are carbonate formations with mixed wet and oil wet rocks. One of the techniques to improve the oil recovery from these reservoirs is surfactant treatment in the water invaded zone of carbonate fractured formation known as surfactant-aided gravity drainage. A number of experimental and modeling studies are available in this research area however, a modeling approach validated with the experimental data to consider different conditions in the reservoir, including rock physics, fluid properties, water salinity and surfactant functionalities is still a necessary element before the pilot tests for this recovery technique. In this work, a modeling approach is proposed to provide insight into the engineering aspects of this process. It defines a reservoir rock matrix (core scale) surrounded by the surfactant-brine solution in the fracture that acts as a boundary for the matrix in an imbibition test scenario. The reservoir rock is oil wet, therefore at first, the diffusive forces drive the solution into the matrix leading to wettability alteration. Afterward the counter-current imbibition takes place in the early through the middle time of the experiment. Finally, the gravity drainage controls the recovery process. The parametric analysis investigates the effects of various parameters. Different modifications to the base case (validated with the experimental data) are performed for each parameter and then the resultant recovery curves are compared with the base case recovery. The parametric study

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