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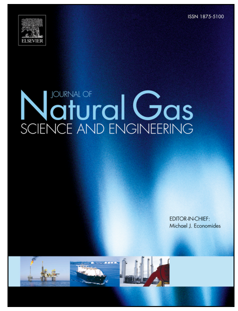


# Maximizing fracture productivity in unconventional fields; analysis of post hydraulic fracturing flowback cleanup

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# Maximizing Fracture Productivity in Unconventional Fields; Analysis of Post Hydraulic Fracturing Flowback Cleanup

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## Abstract

Hydraulic fracturing, is a promising stimulation technique which is also known as hydrofracturing, hydrofracking and fracking. During the hydraulic fracturing (HF), the rock is cracked, i.e., fractured, by a high pressure injection of a fluid which is known as fracturing fluid (FF). The FF is mainly water, carrying suspended sand or another type of proppants into the well to initiate fractures in the reservoir rock, and consequently, hydrocarbon and FF will move towards the well more easily through fractures.

Hydro-fracturing is extensively used to increase the well productivity index, particularly in unconventional, tight and ultra-tight reservoirs. This expensive procedure, though, sometimes fails to meet expectations regarding the production enhancement. The leading explanations for this reduced performance is fracture clean-up inefficiency of the fracturing fluid (FF) that was primarily injected.

In this study, a parametric investigation of FF clean-up effectiveness of fractures was performed with 143360 simulations (in 35 different sets) including injection, shut-in and production stages. Because of the vast number of simulation runs which was required to be implemented by a reservoir simulator, a computer code was developed and utilised to routinely read input data, implement the simulation runs and produce output data. In each set (which consists of 4096 runs), instantaneous impacts of twelve different parameters (fracture and matrix permeability (i.e., Kf and Km) and capillary pressure (Pc), end points and exponents of gas and FF in the Brooks-Corey relative permeability correlation in both fracture and matrix) were investigated. To sample the domain of variables and to study the results, full factorial experimental design (two-level FFS) and linear surface methodology explaining the dependency of the loss in gas production, compared to the case there is no loss (i.e., 100% clean-up) to the related parameters at different production stages were