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# Simultaneous investigation of the effect of Rock morphology and capillary number on water breakthrough time

The current study focuses on pore-scale simulation and analysis of oil displacement in digital rocks, a novel approach for tracking and enhancing oil recovery in porous media. This research explores the impact of water flooding on oil recovery in three digital rock samples with identical porosity but varying morphologies. Utilizing computational fluid dynamics, numerical simulations were conducted to assess the influence of pore and throat sizes on water breakthrough time, residual oil saturation, and oil displacement patterns. Injection speed, mobility ratio, and interfacial tension were manipulated to investigate these effects further. The findings reveal that rocks with smaller pores and throats facilitate faster water breakthrough and reduced breakthrough time. Conversely, enlarging these features leads to increased fingering time. The morphology of the rock significantly influences the oil recovery process, influencing the fingering regime based on breakthrough time and pore injection.

## Student presentation contest

Opt in

## Journal Submission

Not Interested

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Opt In

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