

## Imbibition Assisted Oil Recovery

*Orkhan H Pashayev, Erwinsyah Putra, Dewi T Hidayati, David S Schechter*

### Abstract

#### Background

Imbibition describes the rate of mass transfer between the rock and the fractures. Therefore, understanding the imbibition process and the key parameters that control the imbibition process is crucial. Capillary imbibition experiments usually take a long time, especially when we need to vary some parameters to investigate their effects. Therefore, this research presented the numerical studies with the matrix block surrounded by the wetting phase for better understanding the characteristic of spontaneous imbibition, and also evaluated dimensionless time for validating the scheme of upscaling laboratory imbibition experiments to field dimensions.

#### Results

Numerous parametric studies have been performed within the scope of this research. The results were analyzed in detail to investigate oil recovery during spontaneous imbibition with different types of boundary conditions. The results of these studies have been upscaled to the field dimensions. The validity of the new definition of characteristic length used in the modified scaling group has been evaluated. The new scaling group used to correlate simulation results has been compared to the early upscaling technique.

#### Conclusions

The research revealed the individual effects of various parameters on imbibition oil recovery. Also, the study showed that the characteristic length and the new scaling technique significantly improved upscaling correlations.

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*Pashayev, Putra,  
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