
Contribution ID: **598** Type: **Poster (+) Presentation**

# Parametrization of uncertainty for predictive modeling of subsurface flow problems

*Tuesday, 1 June 2021 20:00 (1 hour)*

We are concerned with a Bayesian framework for rock characterization consisting of a preconditioned Markov chain Monte Carlo (MCMC) method in conjunction with a truncated KL [1] expansion for the parametrization of the underlying uncertainty in subsurface properties [2]. Reduction of the overall uncertainty in determining reservoir characteristics can be achieved through the incorporation of static (e.g., measurements of rock properties at sparse locations) and dynamic data (e.g., saturation values at sparse locations or production curves) in the characterization framework.

In this work we focus on the generation of conditional random fields, that honor known values of the permeabilities at given locations (static data). The model problem considered is the two-phase immiscible displacement with unfavorable viscosity ratio in a heterogeneous reservoir. Initially we review currently available procedures for incorporating sparse measurements in truncated KL expansions. We show that they may produce unwanted inaccuracies in the prediction of subsurface flows. Motivated by these results we propose a novel, projection-based conditioning procedure that overcomes the difficulties that have been identified, and show that the new procedure produces accurate predictions while taking into account sparse measurements of rock properties.

## Time Block Preference

Time Block B (14:00-17:00 CET)

## References

[1] M. Loève, Probability Theory, Springer, Berlin, 1997.
[2] A. Al-Mamun, J. Barber, V. Ginting, F. Pereira, A. Rahunanthan, Contaminant transport forecasting in the subsurface using a Bayesian framework, Applied Mathematics and Computation 387 (2020) 124980.

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