

SPE Subsurface Study Group Lunch

Effective Reservoir Descriptions for Dynamic Model Updating

Date: Thursday, March 13, 2014, 11:30 a.m.

Venue: Petroleum Club (12th Floor) at 5060 California Ave. in Bakersfield

Speaker: Dr. Behnam Jafarpour, professor of petroleum engineering at USC Viterbi School of Engineering

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Abstract

High resolution descriptions of geologic variability in reservoir models are important for modeling fluid flow and transport processes in the reservoir and predicting oil and gas production. However, data limitation and multi-scale heterogeneity of geologic formations necessitate interpolation and extrapolation of reservoir properties beyond the collected data, which is usually accompanied by simplifying assumptions. As a result, a significant level of uncertainty is introduced into description of reservoir properties, which directly affects development planning. In particular, estimating high-resolution heterogeneous reservoir model properties from dynamic production and monitoring measurements often leads to an underdetermined inverse problem, also known as history matching, that usually have many non-unique solutions. Since geologic depositions are formed as continuous layers with local discontinuities, they exhibit strong spatial correlations. Consequently, the salient connectivity features in reservoir property maps become amenable to compact representations, a property that can be exploited to improve the ill-posed nature of the history matching inverse problem. In this talk, I will review compact (or reduced-order) representation of rock property maps and discuss an effective reservoir description and history matching approach that offers flexibility and robustness against prevailing geologic uncertainty.

Short Bio

Behnam Jafarpour is currently an assistant professor of petroleum and electrical engineering at USC Viterbi School of Engineering where he leads the Subsurface Energy and Environmental Systems lab. He previously served as an assistant professor of Petroleum Engineering at Texas A&M University from 2008 to 2011. He earned his MS and PhD degrees in electrical engineering and environmental engineering, respectively, from MIT in 2008. His research focuses on applying the principles of systems theory and signal processing to identification and development of subsurface systems and in particular oil and gas reservoirs. He is the recipient of the 2012 SPE Junior Faculty Research Initiation Award and the 2013 Distinguished Achievement Award of the SPE Western North America Region.