Executive Summary

First, I would like to take this opportunity to recognize and thank outgoing Associate Editor Jeff Jones for his contributions while serving on the *SPE Reservoir Evaluation & Engineering* editorial review committee and welcome incoming Associate Editors Dimitrios Hatzignatiou and Bo Ren. I also want to thank all associate editors and technical reviewers for volunteering countless hours to ensure timely, quality reviews and technically sound recommendations. It is your contributions that make *SPE Reservoir Evaluation & Engineering* a leading journal within the Reservoir Evaluation–Engineering community.

This issue of *SPE Reservoir Evaluation & Engineering* features 25 papers that represent an excellent cross-section of the latest advancements in trending technologies within the industry. In this issue, two papers appear in the spotlight on machine learning and data analytics. The first paper presents a model for predicting well performance in the Bakken, and the second paper presents a model to forecast oil-price volatility. Both papers showcase the development and application of predictive tools that are data-driven. Also featured in this issue are papers related to unconventional resource development, engineered water for waterflooding, enhanced oil recovery, formation evaluation, and reservoir management and simulation.

Below are brief descriptions of the papers presented in this issue.

SPOTLIGHT: Machine Learning and Data Analytics in Petroleum Engineering. *Production-Strategy Insights Using Machine Learning: Application for Bakken Shale* presents a novel approach for selecting important geological and completion parameters and predicting well performance in the Bakken using machine learning based on a data-set of more than 2,000 horizontal wells.

Artificial Intelligence Approach for Modeling and Forecasting Oil-Price Volatility introduces a new predictive model to forecast the futures price volatility of West Texas Intermediate crude based on a hybrid approach of artificial intelligence with a genetic algorithm, artificial neural network, and data-mining time series.

Unconventional Reservoir Development and Management. *Analyzing the Well-Interference Phenomenon in the Eagle Ford Shale/Austin Chalk Production System With a Comprehensive Compositional Reservoir Model* presents a study on the effect of an infill well in the Eagle Ford on the production performance of a parent well in the Austin Chalk based on a reservoir model that considers the nanopore-confinement effect and uses an embedded discrete-fracture model for dynamic fracture modeling.

Understanding the Mechanism of Interwell Fracturing Interference With Reservoir/Geomechanics/Fracturing Modeling in Eagle Ford Shale proposes a modeling workflow for investigating the interference mechanism and quantifying the effects of parent-well fracture geometry, differential stress, and the design of infill-well completions on interwell fracturing interference in the Eagle Ford.

Integrating Model Uncertainty in Probabilistic Decline-Curve Analysis for Unconventional-Oil-Production Forecasting introduces a Bayesian approach to integrate model uncertainty in probabilistic decline curve analysis for unconventional plays.

Engineered Waters for Waterflooding. *Crude-Oil/Brine Interaction as a Recovery Mechanism for Low-Salinity Waterflooding of Carbonate Reservoirs* investigates the recovery mechanisms in limestones associated with the formation of water-in-oil micro-dispersions generated when low-salinity brine encounters crude oil and the suppressed snap-off effect caused by the presence of sulfate in seawater-equivalent-salinity brines.

Effects of Salinity and Individual Ions on Crude-Oil/Water Interface Physicochemical Interactions at Elevated Temperature investigates the effects of both salinity and individual water ions at elevated temperatures on different physicochemical interactions occurring at the oil/water interface and compares the results with previously reported data at ambient temperature.

Wettability Alteration of Carbonate Reservoir Cores—Laboratory Evaluation Using Complementary Techniques presents a set of diverse experimental data that confirms adding low concentrations of anionic and nonionic surfactants to diluted seawater improves oil recovery from carbonate reservoirs.

Chemical Enhanced Oil Recovery. *Surfactant-Polymer Flooding: Chemical-Formulation Design and Evaluation for the Raudhatain Lower Burgan Reservoir, Kuwait* describes the extensive laboratory work that was performed to design a surfactant-polymer formulation for high-temperature (180°F/82°C), high-salinity, and light-oil reservoirs such as the Raudhatain Lower Burgan reservoir.

Effect of Layering on Incremental Oil Recovery From Tertiary Polymer Flooding presents a correlation to estimate the combination of permeability contrast, water/oil-viscosity ratio, and polymer/water-viscosity ratio that will give the maximum incremental oil recovery from polymer flooding in layered reservoirs.

Conformance Improvement in Oil Reservoirs by Use of Microemulsions introduces a novel conformance-improvement method that consists of cyclical injections of surfactant alternating with brine.

CO2 Enhanced Oil Recovery. *Modeling of Nanoparticle-Stabilized CO_2 Foam Enhanced Oil Recovery* presents how a population-balance mechanistic foam model can be used to fit experimental data and determine required model parameters and investigates the applicability of nanoparticle foams for mobility control.

An Experimental Investigation of Immiscible-CO_2-Flooding Efficiency in Sandstone Reservoirs: Influence of Permeability Heterogeneity presents a systematic experimental approach to investigate the effect of core-scale heterogeneity on the performance of immiscible-CO_2 displacement in sandstone reservoirs.

Post-Combustion Carbon Dioxide Enhanced-Oil-Recovery Development in a Mature Oil Field: Model Calibration Using a Hierarchical Approach applies a novel geologic-model parameterization and history-matching workflow for modeling a mature oil field that is currently being developed with CO_2 enhanced oil recovery.

Thermal Recovery. *Phase-Behavior Modeling of Oils in Terms of Saturates/Aromatics/Resins/Asphaltenes Fractions* proposes a comprehensive pseudoization technique that accounts for both reactivity and phase behavior of a reactive/compositional process such as in-situ combustion.

Comparative Study of Oil-Dilution Capability of Dimethyl Ether and Hexane as Steam Additives for Steam-Assisted Gravity Drainage presents a comparative study between dimethyl ether and *n*-hexane in diluting Athabasca bitumen and provides new experimental data of the mixtures that include bubblepoint pressures, densities, and viscosities.

Performance of Air Injection vs. CO_2/Water Injection in a Tight, Light-Oil Reservoir: A Laboratory Study presents a comparative study between air injection and immiscible CO_2/water-injection enhanced-oil-recovery processes for a tight, light-oil reservoir.

Formation Evaluation. *A Study of Gel-Based Conformance Control Within Fractured Carbonate Cores Using Low-Field Nuclear-Magnetic-Resonance Techniques* demonstrates the use of NMR measurements from corefloods to evaluate the potential of a polyacrylamide/chromium gel system for improving sweep efficiency in high-temperature/high-salinity carbonate reservoirs.

Representative-Elementary-Volume Analysis of Two-Phase Flow in Layered Rocks presents a study that identifies the range of the length scales for which either experimental or numerical determination of relative permeability is reliable for layered rocks.

Reservoir Simulation. *Correlation-Based Adaptive Localization For Ensemble-Based History Matching: Applied To the Norne Field Case Study* presents the application of an approach to enhance the applicability of localization for ensemble-based history-matching by using correlations between model variables and simulated observations.

Modeling Dynamic Behaviors of Complex Fractures in Conventional Reservoir Simulators proposes an approach to model stress-dependent fracture conductivity and natural-fracture activation that uses a general numerical method combined with empirical correlations and geomechanical criteria.

Reservoir Management. *Drill and Learn: A Decision-Making Work Flow To Quantify Value of Learning* introduces a practical and computationally efficient workflow, “drill and learn,” to assess the value of learning for different field-development scenarios through a series of numerical experiments.

Fast Analysis of Optimal Improved-Oil-Recovery Switch Time Using a Two-Factor Production Model and Least-Squares Monte Carlo Algorithm illustrates the application of a useful and tractable approach for analyzing the optimal time to begin an improved-oil-recovery process using a two-factor production model and a least-squares Monte Carlo algorithm.

Improving Oil-Rate Estimate in Capacitance/Resistance Modeling Using the Y-Function Method for Reservoirs Under Waterflood proposes a robust approach to improve oil-production forecasts for waterfloods by combining capacitance/resistance gross-production rates with a Buckley-Leverett displacement-waterflood analytical method, the *Y*-function method, to calculate oil fractional flow.

Pressure Transient Analysis of Polymer Flooding With Coexistence of Non-Newtonian and Newtonian Fluids presents an analytical solution of pressure transient behavior in two-phase flow of non-Newtonian and Newtonian fluids that enables transient testing and analysis of polymer floods.

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