Dear UEFA Forum Members,

We hope you are enjoying work and life. UEFA would like to update you with our recent events as well as research discoveries in the subject of upstream engineering and flow assurance.

2017 AIChE Annual Meeting Recap

The Annual Meeting in Minneapolis earlier this month was a great success. UEFA had a total of 25 talks in 4 technical sessions and 13 poster contributions. Michael Connolly of Stanford University was the winner of the UEFA Best Poster Award for his work on "Three-Phase Equilibrium Computations for Hydrocarbon-Water Mixtures". In addition, on Monday of the conference UEFA hosted a social event at a nearby Irish Pub. The discussion was lively and we hope to have continued participation both scientifically and socially from UEFA members! Thank you for your contributions and we hope to see you at the Spring Meeting and next year in Pittsburgh.

2018 AIChE Spring Meeting

The 2018 AIChE Spring Meeting will take place from April 22 to April 26, 2018 at the Orlando World Center Marriott. The Upstream Engineering and Flow Assurance Forum will host presentations in following categories: gas hydrates, wax and asphaltenes; innovative solutions for unconventional resources and flow modeling and challenges: multiphase flows and heat transfer. We welcome researchers to join us at the conference and listen to the latest discoveries in upstream engineering and flow assurance. For more information about the conference, please follow the link to AIChE website: https://www.aiche.org/conferences/aiche-spring-meeting-and-global-congress-on-process-safety/2018.

PetroPhase 2018 – July 8-12, 2018

The University of Utah will organize the 2018 International Conference on Petroleum Phase Behavior and Fouling (PetroPhase) at The Chateaux at Deer Valley, Park City, Utah. The PetroPhase conference is closely related to UEFA topics and please visit: https://petrophase2018.che.utah.edu/ to receive updates about the conference.

Student Research Highlights

This episode of the student research highlights showcases the investigation on the prediction of crude oil PVT behaviors with PC-SAFT equation of state. The research is contributed by scholars from Rice University (link to paper). If you would like your published papers to be highlighted in our newsletters, please submit a short paragraph and a graphical abstract formatted as above to sheng. zheng@suez.com.

Sincerely,

The UEFA Leadership Team

www.aiche.org/uefa

UE&FA

Networking of experts.
Promoting knowledge.
Solving Problems.

Student Research Highlights

Efficient Algorithm for the Prediction of PVT Properties of Crude Oils Using the PC-SAFT EoS

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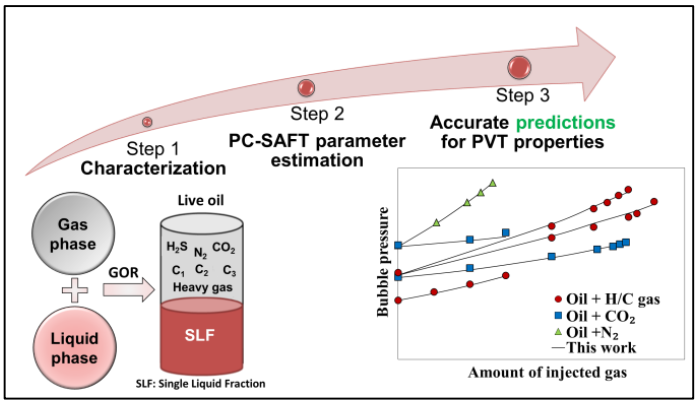

The development of models for the prediction of crude oil properties has been the topic of extensive research since the 1940's. Understanding the behavior of crude oils at reservoir conditions is essential in developing efficient production scenarios, and establishing successful field development plans. The early attempts for modeling crude oil properties were based on empirical correlations of an extensive set of data which correlate bulk oil properties to each other, without taking into account the actual composition of the crude oil.[1–11] Although this approach found some use in the oil industry motivated by its simplicity, it can be unreliable and lead to significant errors in modeling crudes that are different than the samples used for the regression procedure.

A new simplified approach is investigated for characterizing crude oils using the Perturbed Chain version of the Statistical Associating Fluid Theory equation of state (PC-SAFT EoS). The new approach models the liquid phase in crude oil as one pseudo-component called "Single Liquid Fraction" (SLF). The SLF approach requires a single fitting parameter called aromaticity (γ_{SLF}) which is fitted to experimental bubble point and density at saturation. The model does not require SARA analysis as an input. Simulation results for 10 light crudes from the Middle East are compared against 2078 data points from PVT experiments that include: constant composition expansion (CCE), differential liberation (DL), separator test, and swell test experiments. It is found that the model predictions of density are the most accurate, with average absolute percent deviation (AAPD) of 0.5% in the CCE, 0.7% in the DL, 0.8% in the separator test, and 2.1% in the swell test.

Most interestingly, the model is capable of accurately predicting the bubble pressure of oil blends with various types of injection gas, including: lean and rich hydrocarbon gases, CO_2, N_2, and H_2S with injection up to 71.43 mol%. The new model can predict bubble pressure of these blends with AAPD of 3.4%. The SLF characterization method, which uses PC-SAFT EoS, provides a powerful tool to aid in PVT studies and development of EOR or field development scenarios. The ability to perform accurate PVT predictions using one pseudo-component in the liquid phase is a mere reflection of the high capability of PC-SAFT EoS in capturing the phase behavior of reservoir fluids.