

## **Modeling Asphaltene Phase Behavior in Crude Oil Systems**

Francisco Vargas and Walter Chapman<sup>C, S</sup>  
*Rice University, Houston, TX, U.S.A.*

Asphaltene precipitation and deposition can occur at different stages during petroleum production causing reservoir formation damage and plugging of pipeline and production equipment. Predicting asphaltene flow assurance issues requires the ability to model phase behavior of asphaltenes as a function of temperature, pressure, and composition. In this presentation, we review some recent approaches to model asphaltene phase behavior. We also present a method to characterize crude oil including asphaltenes using the perturbed chain form of the Statistical Associating Fluid Theory (PC-SAFT). The theory accurately predicts crude oil bubble point and density as well as asphaltene precipitation conditions. The theory is used to examine the effects of gas injection, commingling of reservoir fluids, and asphaltene polydispersity on the phase behavior of asphaltenes. The analysis produces some interesting insights into field and laboratory observations of asphaltene phase behavior.