



ENHANCED OIL RECOVERY

The conventional flash calculations increase significantly with the number of components, making it impractical for use in many fine-grid compositional simulation and other applications. Previous research to increase flash-calculation speed has been limited to those with zero binary interaction parameters (BIPs) or approximate methods based on eigenvalue analysis of the binary interaction matrix. Practical flash calculations, however, nearly always have some nonzero BIPs. Further, the accuracy and speed of the eigenvalue methods varies depending on the choice and number of the dominant eigenvalues. This paper presents a new and simple method for significantly increasing the speed of flash calculations for any number of nonzero BIPs. The approach requires the solution of up to 3 reduced parameters regardless of fluid complexity or the number of components and is based on decomposing the BIPs into two parameters using a simple quadratic expression. The new approach is exact in that the equilibrium phase compositions for the same BIPs are identical to those with the conventional flash calculation; no eigenvalue analysis is required. Further, the new approach eliminates the Rachford-Rice procedure and is more robust than the conventional flash-calculation procedure. We demonstrate the new approach for several example fluids and show that speeding by a factor of approximately 3 to 20 is obtained over conventional flash.

Agenda

Workshop and Reception • Thursday, November 21, 2019 C213 Coal Utilization Lab, EMS Energy Institute

2:30 – 5:00 pm	Experimental Analysis of Alkali-Salt-Alcohol Phase Behavior with OMV Crude Oil Daulet Magzymov, Russell Johns, and OMV staff only
5:00 – 5:30 pm	Travel to restaurant
5:30 – 7:30 pm	Dinner at Spats at the Grill (formerly Allen Street Grill), 100 West College Ave., 814-231-4745
	End of Workshop

Technical Presentations • Friday, November 22, 2019 C213 Coal Utilization Lab, EMS Energy Institute

8:00 – 8:10 am	Coffee and continental breakfast
8:10 – 8:30 am	Welcome and Introductory Remarks Russell Johns
8:30 – 9:00 am	Oil Recovery from Diffusive Transport During Huff'n'Puff Michael Cronin, Hamid Emami-Meybodi, and Russell Johns
9:00 – 9:20 am	Demonstration of PennShale Toolkit Michael Cronin, Hamid Emami-Meybodi, and Russell Johns
9:20 – 9:50 am	Development of an Accurate LBM Code for Permeability Estimation from CT Images Xiaolong Ouyang and Russell Johns
9:50 – 10:10 am	Break
10:10 – 10:40 am	Advances in Developing a New Relative Permeability Equation-of-State Prakash Purswani, Russell Johns, and Zuleima Karpyn
10:40 – 11:20 am	High Temperature Contact Angle Modeling for Enhanced Oil Recovery Tim Duffy, Serguei Lvov, and Russell Johns
11:20 – 11:50 pm	Investigating the Effect of Oil Chemistry on Chemically-Tuned Waterflooding Miral Tawfik, Zuleima Karpyn, and Russell Johns

Agenda Continued

Technical Presentations • Friday, November 22, 2019
C213 Coal Utilization Lab, EMS Energy Institute

11:50 – 1:00 pm	Lunch at CUL
1:00 – 1:30 pm	Modeling the Effect of Reaction Kinetics and Dispersion during Low-Salinity Waterflooding Daulet Magzymov, Prakash Purswani, Zuleima Karpyn, and Russell Johns
1:30 – 2:10 pm	Improved Equation-of-State Modeling for Surfactant EOR and PennSurf Update Daulet Magzymov and Russell Johns
2:10 – 2:40 pm	Measurement of Microemulsion Phase Behavior of Complex Alcohol-Surfactant Mixtures at High Pressure Hafsa Abubaker Hashim Abboud and Russell Johns
2:40 – 3:00 pm	Break
3:00 – 3:30 pm	Theory of Bicontinuous Microemulsion Viscosity Considering Interfacial Phenomenon Pooya Khodaparast and Russell Johns
3:30 – 4:00 pm	Incorporation of Physical Viscosity Model into a Chemical Flooding Simulator Pooya Khodaparast and Russell Johns
4:00 – 4:30 pm	Compositional Dependence of Viscosity in Microemulsion Systems Daulet Magzymov, Pooya Khodaparast, and Russell Johns
4:30 – 5:00 pm	Discussion of Research Direction
5:00 pm	End of Meeting