

# **1st International Conference on Upstream Engineering and Flow Assurance 2012**

**Topical Conference at the 2012 AIChE Spring Meeting and 8th  
Global Congress on Process Safety**

**Houston, Texas, USA  
1-5 April 2012**

**ISBN: 978-1-62276-569-0**

**Printed from e-media with permission by:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571



**Some format issues inherent in the e-media version may also appear in this print version.**

Copyright© (2012) by AIChE  
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact AIChE  
at the address below.

AIChE  
3 Park Avenue  
New York, NY 10016-5991

Phone: (203) 702-7660  
Fax: (203) 775-5177

[www.aiche.org](http://www.aiche.org)

**Additional copies of this publication are available from:**

Curran Associates, Inc.  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: 845-758-0400  
Fax: 845-758-2634  
Email: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

# TABLE OF CONTENTS

<b>Process Safety and Corporate Responsibility</b> .....	N/A
<i>Michael Dolan</i>	
<b>Horizons in Multiphase Flow</b> .....	1
<i>Geoffrey F. Hewitt</i>	
<b>Transient Multiphase Flow - Past, Present and Future with Flow Assurance Perspective</b> .....	2
<i>Tom Danielson</i>	
<b>"Steady-State Multiphase Flow Modeling " Past, Present and Future with a Flow Assurance Perspective</b> .....	3
<i>Mack Shippen, William Bailey</i>	
<b>Characterization of Confidence in Multiphase Flow Predictions</b> .....	4
<i>G. Kouba, Hariprasad J. Subramani, Selen Cremaschi</i>	
<b>High-Viscosity Oil Multiphase Pipe Flow</b> .....	5
<i>Hong-Quan Zhang, Cem Sarica, Eduardo Pereyra</i>	
<b>Dynamic Models in Multiphase Flow</b> .....	6
<i>Ole J. Nydal</i>	
<b>R&amp; D Efforts to Control, Monitor and Identify Drilling Fluid Invasion in Reservoir Rocks</b> .....	7
<i>Andre Leibsohn Martins, Alex Tadeu A. Waldmann, Elessandre Souza, Alex Rodrigues De Andrade, C. M. Scheid, L. A. Calçada, R. Z. Moreno, C. E. Dannenhauer, S. A. Loureiro</i>	
<b>Comparative Analysis of Gelled Fluids Through Large Amplitude Oscillatory Shear Rheology (LAOS)</b> .....	18
<i>Jason Maxey</i>	
<b>Using Polymer Elasticity to Scale up Lab Characteristics to Field Applications of Friction Reducers</b> .....	31
<i>Ahmed M. Gomaa, Jing Zhou, Hong Sun, Qi Qu</i>	
<b>Efficient Displacement of Synthetic or Oil-Based Mud and Transitional Phase Inversion</b> .....	50
<i>Lirio Quintero, Jean-Louis Salager, Ana Forgiarini, Gianna Pietrangeli, Jonathan Brege</i>	
<b>Mass Transfer Effects in Bore-Hole Filter-Cake Cleanup</b> .....	62
<i>Jeffrey Harwell, David Sabatini</i>	
<b>Advances in Produced Water Treatment</b> .....	63
<i>Timothy P. Daigle, Savanna Hantz, Brian Phillips, Rafique Janjua</i>	
<b>Advanced Pipeline Monitoring for Flow Assurance with Fiber Optics</b> .....	64
<i>John D. Hedengren, David Brower</i>	
<b>Real-time Monitoring of a Subsea Boosting System</b> .....	66
<i>Phaneendra B. Kondapi, Anita Sengebusch</i>	
<b>Quantifying Flow Assurance Risks During Front End Engineering Design</b> .....	70
<i>Allan Rydahl, Richard Shea</i>	
<b>Multiphase Flow - The Flowing Phases Know What They Are Doing, But Do We?</b> .....	71
<i>Sam Kashou</i>	
<b>Integrating Life Cycle Dynamic Simulation and Training for Efficient Design, Startup, and Operation: Insuring Against Future Disasters</b> .....	72
<i>Norm Stewart</i>	
<b>Quantifying Asphaltene Impairment Risks During Front End Engineering Design</b> .....	78
<i>Stefan Smuk, Ian Roberts</i>	
<b>Designing and Delivering Integrated Control, Monitoring and Optimization Systems for Subsea or Topside Systems</b> .....	79
<i>Espen Storkaas, Olav Slupphaug, Bjorn Bringedal</i>	
<b>Interfacially-Active Nanohybrids for Improved Oil Recovery</b> .....	80
<i>Daniel E. Resasco, Jeffrey Harwell, Santiago Drexler, Jimmy A. Faria, M. Pilar Ruiz, J. Baez, Bor-Jier Shiau</i>	
<b>Effect of Nanoparticle As Interfacial Modifiers in EP Operations</b> .....	81
<i>Ramanan Krishnamoorti</i>	
<b>Rock-Based Micromodel and CFD Studies of Nanomaterial Transport for Reservoir Applications</b> .....	82
<i>Karsten E. Thompson, Saade Bou-Mikael, Daniel S. Park, Dimitris Nikitopoulos, Clinton S. Willson</i>	
<b>Stability of Nanoparticles At Reservoir Conditions and Applications for Conformance Control</b> .....	N/A
<i>Quoc P. Nguyen</i>	
<b>New Nano-Particle Based Drilling Fluids</b> .....	83
<i>Mukul M. Sharma, Martin Chenevert, Chung-Min Jang, James Friedheim</i>	
<b>Designing Brine-Stable, Transportable Nanoparticles for Downhole Sensing</b> .....	84
<i>Michael S. Wong, James M. Tour, Mason B. Tomson</i>	

<b>Flow Assurance: Modeling Wax Deposition in Subsea Pipelines</b> .....	85
<i>H. Scott Fogler</i>	
<b>Asphaltenes Deposition</b> .....	86
<i>Jill Buckley</i>	
<b>Review of Paraffin Deposition Under Multiphase Flowing Conditions</b> .....	87
<i>Cem Sarica, Ekarit Panachareonsawad</i>	
<b>Asphaltene Solubility and Fluid Compatibility</b> .....	88
<i>Irv Wiehe</i>	
<b>Wax Deposition and Control in North Sea Oil and Gas Production Systems</b> .....	89
<i>Hans P. Ronningsen</i>	
<b>New Asphaltene Nanoscience and Its Impact on Reservoir Characterization</b> .....	90
<i>Oliver Mullins</i>	
<b>Available Know-how in Transforming an Emulsified Drilling Fluid to Be Removed from Unwanted Location Into a Low-viscosity Single Phase System</b> .....	91
<i>Jean-Louis Salager, Ana Forgiarini, Lirio Quintero</i>	
<b>Aqueous Polymer-Surfactant Mixtures for Wellbore Treatment and Completion</b> .....	106
<i>Mario R. Rojas, Jeffrey Harwell, Bor-Jier Shiau</i>	
<b>New Method for Removing Formation Damage with Nanoparticle Dispersions</b> .....	113
<i>Paul M. McElfresh, David Holcomb, Daniel Ector</i>	
<b>Temperature Control of Drilling Fluid with Phase-Change Materials</b> .....	122
<i>Othon R. Monteiro, Lirio Quintero, Martin Bates, Duncan Bruce, Elizabeth Wilcock, Antonina I. Smirnova, Alastair J. Logan</i>	
<b>Phase Behavior of Reservoir Fluids: Comparisons of PC-SAFT and Cubic Equation of State Simulations</b> .....	131
<i>Sukit Leekumjorn, Kristian Krejbjerg</i>	
<b>Volume-Translated Cubic Eos and PC-SAFT Density Models and a Free Volume-Based Viscosity Model for Hydrocarbons At Extreme Temperature and Pressure Conditions</b> .....	143
<i>Mark A. McHugh, Babatunde Bamgbade, Yue Wu, Ward A. Burgess, Deepak Tapriyal, Bryan Morreale, Yee Soong, Hseen Baled, Robert M. Enick</i>	
<b>SAFT Model for Upstream Applications</b> .....	163
<i>Walter G. Chapman, Sai R. Panuganti, Francisco M. Vargas, Doris L. Gonzalez</i>	
<b>Prediction of Gas Injection Effect on Asphaltenes Precipitation Using Different Thermodynamic Models</b> .....	220
<i>Doris L. Gonzalez, Frank Lim, Nikhil Joshi, Wilson A. Cañas, Raul Osorio</i>	
<b>A Generalized Partial Molar Algorithm Provides Fast Estimates of CO<sub>2</sub> Storage Capacity in Depleted Oil and Gas Reservoirs</b> .....	256
<i>Maria Barrufet, Ernesto Valbuena</i>	
<b>Integrated Equation of State Modelling for Flow Assurance</b> .....	270
<i>Richard Szczepanski, Nuno Pedrosa, Xiaohong Zhang</i>	
<b>Unconventional Natural Gas How Much At What Cost?</b> .....	286
<i>Stephen A. Holditch</i>	
<b>Natural Gas Hydrates: An Emerging Massive Energy Source</b> .....	287
<i>Michael J. Economides, Xiuli Wang, Harold Brannon</i>	
<b>Production Strategy for Marine Hydrates Reservoirs</b> .....	288
<i>Jyoti Phirani, Kishore K. Mohanty</i>	
<b>Massively Parallel Simulation of Field-Scale Oceanic Gas Hydrate Deposits</b> .....	289
<i>Matthew T. Reagan, George J. Moridis, Jeffrey N. Johnson, Lehua Pan, Katie L. Boyle, Craig M. Freeman</i>	
<b>Hydraulic Fracture Height Growth - Real</b> .....	290
<i>Kevin Fisher, Norman Warpinski</i>	
<b>Optimization of Marine CNG Transport for Stranded Gas</b> .....	291
<i>M. Nikolaou</i>	
<b>Adsorption of Ethoxylated Alkyl Phenols from High Salinity Brines</b> .....	292
<i>David Goodwin Jr.</i>	
<b>CFD Modeling of Drop Coalescence - Improving Separator Efficiency</b> .....	304
<i>Santosh Appathurai</i>	
<b>CFD Modeling of Electrically-Enhanced Oil-Gas Separators</b> .....	305
<i>Krishnaraj Sambath</i>	
<b>On-Line Monitoring of Multiphase Composition Using Differential Dielectric Sensor (DDS)</b> .....	N/A
<i>Hui Li, Ram S. Mohan, Jack D. Marrelli, Shoubo Wang, Ovadia Shoham</i>	
<b>Asphaltenes From Tahe and Liaohe Oils: Structural Analysis and Their Interaction with Comb-Type Copolymers</b> .....	306
<i>Tao Yang, Jun Xu, Xuhong Guo</i>	

<b>Effect of Process Parameters on Dispersion Characterization of Crude Oil-Water/Brine Emulsions</b> .....	N/A
<i>Prem Bikkina, Yi Zhang, Ram S. Mohan, Luis Gomez, Ovadia Shoham, Carlos Avila</i>	
<b>Multiphase Flow in Downcomers and Vertical Separators</b> .....	N/A
<i>Jose Lopez, Ram S. Mohan, Ovadia Shoham, Gene Kouba, Karl Anderson</i>	
<b>Scaling in Oil and Gas: Understanding Surface and Bulk Processes</b> .....	307
<i>Anne Neville</i>	
<b>The Role of Scale in Flow Assurance</b> .....	308
<i>Mason B. Tomson, Amy T. Kan, Wei Shi, Wei Wang, Essmail Djamali, Chao Yan, Nan Zhang, Haiping Lu, Lu Wang, Jonathan A. Pennington, Sarah N. Work</i>	
<b>Emulsion Stabilization, Breaking and Inversion: Advantage or Disaster in Flow Assurance</b> .....	309
<i>Jean-Louis Salager, Ana Forgiarini</i>	
<b>An Overview of Emulsion Stabilization Mechanisms in Petroleum-Water Mixtures</b> .....	310
<i>Peter Kilpatrick</i>	
<b>Effects of Multiphase Flow on Corrosion</b> .....	311
<i>Srdjan Nesic</i>	
<b>Estimation of Parameters for Simulation of Steady State Foam Flow in Porous Media</b> .....	312
<i>Kun Ma, Sibani Lisa Biswal, George J. Hirasaki</i>	
<b>Chemically Enhanced Oil Recovery: Novel Surfactants - The Concept of Large Hydrophobe Alkoxy Carboxylate Surfactants</b> .....	324
<i>Upali Weerasooriya, Gary A. Pope, Sriram Solairaj, Jun Lu, Stephanie S. Adkins, Gayani P. Arachchilage, Do Hong Kim, Christopher Britton</i>	
<b>A New Acid System for Matrix Stimulation of Deep Oil and Gas Wells</b> .....	344
<i>Hisham A. Nasr-El-Din</i>	
<b>Chemical EOR by Wettability Alteration</b> .....	345
<i>Gaurav Sharma, Robin Gupta, Kshitij Mohan, Kishore K. Mohanty</i>	
<b>Polyelectrolyte Nanoparticles for Flow Assurance</b> .....	353
<i>Stephen Johnson, Jenn-Tai Liang</i>	
<b>Smart Surfactants for CO<sub>2</sub> Foams in Enhanced Oil Recovery</b> .....	N/A
<i>Keith P. Johnston</i>	
<b>For a Better Well - Pump More Proppant</b> .....	N/A
<i>Stephen A. Holditch</i>	
<b>Consideration in Production of Liquids From Shale</b> .....	360
<i>Milind D. Deo</i>	
<b>Well Test Analysis of Shale Producing Wells</b> .....	N/A
<i>Mohan Kelkar</i>	
<b>Stress Interference Effects in Hydraulic Fractures in Horizontal Wells in Shales</b> .....	N/A
<i>Mukul M. Sharma</i>	
<b>Multi-Scale Discussions on Mass Transport in Gas Shale Reservoirs</b> .....	368
<i>I. Yucel Akkutlu</i>	
<b>Supercritical Fluid Interaction Between Kerogen and Gas in Shale</b> .....	369
<i>James Holste, Kenneth R. Hall</i>	
<b>Methodology for Characterization of Fluid Properties</b> .....	370
<i>Matt Honarpor, Nagi Nagarajan</i>	
<b>Hydrate Blockage Formation</b> .....	371
<i>Jefferson Creek</i>	
<b>Field Results for Slurry Flow</b> .....	372
<i>Michael Eaton, Jason W. Lachance, Don P. Shatto, Larry D. Talley, Doug J. Turner</i>	
<b>Do We Have New Solutions to the Old Problem of Gas Hydrates?</b> .....	373
<i>Bahman Tohidi, Ross Anderson, Antonin Chapoy, Jinhai Yang, Rod Burgass</i>	
<b>Developing a Comprehensive Transient Hydrate Formation Model: From Laboratory to Field Applications</b> .....	374
<i>Amadeu K. Sum</i>	
<b>Hydrates in the Ocean--Beneath, Around, and Above Production Equipment</b> .....	375
<i>Gregory Hatton</i>	
<b>Understanding and Modeling Hydrate Formation in High Water Producing Oil Pipelines</b> .....	376
<i>Sanjeev Joshi</i>	
<b>Design and Optimize Field Architecture for Deepwater Production Wells Based On Flow Assurance Criteria</b> .....	377
<i>Sridhar Appanapalli, Manjunath Terwad</i>	
<b>Lithologic Heterogeneity and Focused Fluid Flow Governing Gas Hydrate Distribution in Marine Sediments</b> .....	385
<i>Sayantana Chatterjee</i>	

<b>Droplet Transport in near-Horizontal Low Liquid Loading Flows .....</b>	<b>386</b>
<i>Kiran Gawas</i>	
<b>Understanding Foam Flows - Application to Gas-Dominated Flow Systems .....</b>	<b>387</b>
<i>Haijing Gao</i>	
<b>Author Index</b>	