

SPE September 2005 Meeting

“Chemical EOR – The Past; Does It Have a Future?”

By Sara Thomas, Perl Canada Ltd.

Date: Wednesday, September 14, 2005

Venue: Håndværkerforeningen, Dr. Tværgade 2A

Abstract

Chemical EOR methods indeed have a future, a very bright one too. Consider, nearly two trillion barrels of conventional oil worldwide that will be left unrecovered when primary and secondary recoveries have been exhausted. The greater portion of this oil will have to be recovered by clever chemical EOR methods, because other methods are frequently inapplicable, due to unavailability of suitable fluids, among other reasons.

Chemical EOR methods include utilization of polymers, surfactants, alkaline chemicals and their combinations, as in ASP (Alkaline-Surfactant-Polymer), or use of microemulsions as in micellar flooding. Hundreds of field tests have been carried out, with little “technical success”, (viz. production of incremental oil), let alone commercial success. Micellar flooding has been more successful in this regard, at least as far as recovery of tertiary oil is concerned. ASP has been reported to be successful in a few field tests. The economics of both processes were unfavourable until recently, but need to be re-evaluated under the current oil prices.

The reasons for the lack of success include inadequate understanding of the process itself, unscaled laboratory experiments, and low oil prices, exacerbated by less than adequate definition of reservoir geology. Much can be learned from past failures: first about the limitations of a given process, and second, about how a process can be modified for a *given* reservoir – if at all it is feasible. The looming energy crisis necessitates the application of suitable chemical EOR methods for additional oil recovery. Coupled with today’s trend in oil prices, chemical methods stand to hold a bright future sooner than later.

We need to develop reservoir specific EOR technologies, with focus on commercial viability. Examples are offered for selected reservoir conditions. As the oil price increases, so does the cost of chemicals, but in a different proportion. Other important aspects of chemical EOR, viz. types of research and pilot testing needed, development of new methods and scaling criteria for reliable laboratory experiments are also discussed.

Biography

Sara Thomas manages research for PERL Canada, Ltd. She holds B.Sc. and B.Ed. degrees from the University of Kerala, India and a Ph.D. in Chemical Engineering from the University of Birmingham, U.K. She worked as a research associate and conducted research on Chemical EOR methods for 25 years. She has taught courses in petroleum engineering at the University of Alberta for 5 years. She has authored and co-authored 43 papers and 12 research reports on various EOR processes. Currently, she offers courses on EOR methods, miscible and immiscible flooding, gas injection and scale up methods for EOR processes.



SPE October 2005 Meeting

“4D Seismic Overview”

By Jonathan Bown, Ødegaard

Date: Tuesday, October 11, 2005

Venue: Håndværkerforeningen, Dr. Tværgade 2A

Outline

- Introduction to the 4D seismic workflow.
- Early 4D examples, including Ekofisk.
- A more recent AVO example - Gullfaks including application of rock physics for predicting pressure and fluid changes.
- Recent Dan Field published work
- Summary of rock physics understanding of Chalk with regard to prediction and interpretation of time-lapse changes for Chalk fields.
- Challenges and future developments in 4D analysis, e.g. geo-mechanics outside the reservoir, effective stress quantification.

Biography

Jonathan Bown is operations manager for seismic reservoir characterisation company, Ødegaard. Jonathan holds a BA in geology from University of Oxford, an MSc in geophysics from University of Durham and a PhD in geodynamics from University of Cambridge (all UK). Since joining Ødegaard in 1996, Jonathan has enjoyed roles ranging from consultant geophysicist performing service projects, through software development to business manager for Houston and London.



SPE November 2005 Meeting

“Highlights from 3 IVC-SEP Research Projects: Reservoir Modelling, EOR and Corrosion”

By Kent Johansen, Morten R. Kristensen and Philip L. Fosbøl, IVC-SEP, DTU

Date: Tuesday, November 8, 2005

Venue: DTU - Building 101A, Anker Engelundsvej 1, 2800 Lyngby

Challenges in In-Situ Combustion Simulation (by Morten R. Kristensen)

The world continues to rely substantially on petroleum fossil fuels as a primary energy source. While the number of new discoveries of petroleum reservoirs decreases, the need to produce the known reservoirs more effectively increases. So far, only the easiest to produce petroleum accumulations have been utilized, and an advancement in technology is needed to access more difficult to produce reservoirs and to address in a cost-effective manner the volume of oil that remains after primary and secondary recovery operations.

In-situ combustion is a promising EOR method. However, accurate prediction of field performance in in-situ combustion is an immense challenge. The spatial as well as temporal scales vary over many orders of magnitude. The bulk of the chemical reactions take place in the narrow reaction zone that may be less than a meter in thickness compared to reservoir scales of hundreds or thousands of meters. Moreover, combustion reactions often occur in fractions of a second, whereas the temporal scales associated with convective transport may be running to days or years. The computational challenges in in-situ combustion are discussed and preliminary results are shown.

Corrosion in wet gas pipelines (by Philip L. Fosbøl)

Wet gas is natural gas with small amounts of CO₂, saturated in water. During transportation in pipelines water condenses at the cold pipe wall and CO₂ is dissolved in the water. The electrolytic environment is prone to corrode the lower peripheral part of the pipeline. Various corrosion products are produced, only some may protect against corrosion which depends on the chemical environment.

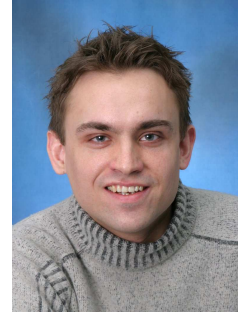
An overview of modelling CO₂ corrosion in natural gas pipelines will be given. Currently an equilibrium model of the corrosion products is being built. Introduction to using the thermodynamic model in a diffusion scheme will be shown.

Statistical methods for history matching (by Kent Johansen)

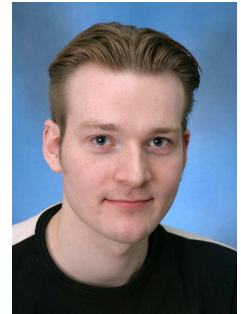
An accurate description of the reservoir properties such as permeability, porosity, etc. is crucial when the operation of a field is planned or optimized. Also production forecasting relies heavily on the accuracy of the reservoir model. To improve its predictive capabilities the model is history matched with historic production data. The procedure of history matching is a complex job involving numerous reservoir simulations and many man-hours. Additionally, the traditional way of history matching the reservoir model may result in a reservoir model which honors the production history but not the prior geologic knowledge from e.g. core analysis. This project deals with automatic or assisted history matching with the aim of developing techniques which are not only fast but also conserve the geologic consistency of the reservoir model. This involves effective parameterization methods based on geostatistics. An overview of these methods is presented and preliminary results are shown.

Biographies

Morten Rode Kristensen is currently studying towards the Ph.D. degree in petroleum engineering at the Department of Chemical Engineering, Technical University of Denmark. He holds an M.Sc. degree in chemical engineering from DTU. His research interests are in the field of reservoir simulation focusing on efficient and reliable simulation of the in-situ combustion enhanced oil recovery process. He recently returned to Denmark after spending 6 months as a visiting researcher at Stanford University.



Philip Loldrup Fosbøl is a Ph.D. student in the research group IVC-SEP at the chemical engineering department of DTU. He holds an M.Sc. degree in chemical engineering from the computer aided process group from KT, DTU. Since September, Philip has been President for the Copenhagen SPE student chapter.



Kent Johansen is a Ph.D. student at the Center for Phase Equilibria and Separation Processes (IVC-SEP), Department of Chemical Engineering, DTU. He holds an M.Sc. degree in chemical engineering from DTU. His research interests are reservoir characterization with main emphasis on history matching and geostatistics. He is also interested in production forecasting and its interaction with reservoir properties. Kent is vice president of the Copenhagen SPE student chapter.



SPE December 2005 Meeting

“Integration of a Performance Drilling Motor and a Rotary Steerable System Combines Benefits of Both Drilling Methods and Extends Drilling Envelope”

By Peter V. Balslev, Mærsk Oil

Date: Thursday, December 8, 2005

Venue: Mærsk, Esplanaden 50, 1263 København K

Abstract

Since their introduction in 1997, rotary steerable drilling systems have delivered significant gains in drilling efficiency, and in addition enabled drilling of more challenging wells with improved well placement.

Continuous rotary drilling operations do however bring with them certain challenges: penetration rate, rig rotary equipment, casing or drill pipe wear, stress on the drill string, loss of drilling power through wellbore friction and drilling dynamics.

High powered drilling motors have been utilized since the early 1990's to improve penetration rates by applying high power directly to the drill bit. This has however been limited to the most basic of directional profiles.

A system has been developed which integrates a specially designed high power drilling motor within a high speed rotary steering assembly. By using this new system:

- many of the challenges of continuous rotary drilling are mitigated,
- more complex wells benefit from the advantages of traditional performance drilling,
- existing drilling envelopes can be extended to further improve field recovery.

This presentation discusses the design of the specially designed motor and the high speed rotary steerable drilling system related to the specific applications and illustrated with results from real examples.

The SPE Paper 91810 was first presented in February 2005 at the SPE Conference in Amsterdam.

Biography

Peter V. Balslev graduated from the Technical University of Denmark in 1995 with a M. Sc. degree in chemical engineering. In March 1996, Peter joined Mærsk Oil as a Well Site Engineer. From 1997 to 1998, he was seconded to Mærsk Oil Qatar in continuation of his Well Site Engineer training position. In his current position of Senior Drilling Engineer the main tasks have been within the areas of well planning/execution and in operational co-ordination and supervision in various aspects such as drilling, completion, workover and slot recovery operational phases.



SPE January 2006 Meeting

“International Joint Ventures – How to Keep Yours on Track”

By Kurt S. Hillman, Amerada Hess, SPE Distinguished Lecturer 2005-2006

Date: Tuesday, January 10, 2006

Venue: Håndværkerforeningen, Dr. Tværgade 2A

Abstract

The deal is done, the negotiators have gone home, and now it is time to implement the joint venture to achieve success for all parties. It sounds easy: just follow the contract and operating agreement. Or, is it?

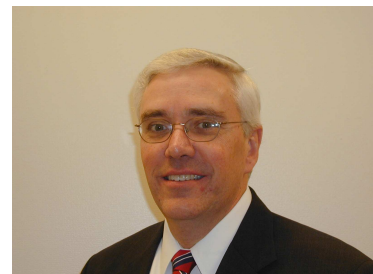
Worldwide exploration and production spending will exceed \$190 billion this year. With over 75% being spent outside the US, joint ventures play a dominant role in international upstream investments and success or failure can have a direct impact on a company's bottom line.

Is your joint venture implementation on track? Does the shareholder board have agreement on a clear set of objectives? Is the organizational structure functioning effectively? Are the different company secondees performing seamlessly as a team within the JV? Is technology transfer occurring? Are equipment and service tender awards meeting project requirements? What are some suggestions for improvement?

Interviews conducted with executives and project management from International Oil Companies and National Oil Companies involved in joint ventures revealed different perspectives as well as varying definitions of success. One thing is clear: joint ventures are evolving and the expectation bar is being raised. Is your company keeping up?

Biography

Kurt Hillman is Vice President, Production, North Africa and Eurasia for Amerada Hess. He was previously Managing Director of Amerada Hess in Denmark. Prior experience includes 25 years with Texaco in various management roles, and a founder of an international upstream management consulting company. His last ten years have been focused on multi-national joint ventures in the Middle East, Kazakhstan, and Russia.



He holds a BSc degree in geological engineering and is a registered professional engineer. Active in SPE, Kurt has served as Program Chairman for the Gulf Coast Section's International Study Group, has been a Director for the Kuwait SPE Section, and has served on SPE's International Career Guidance/Student Development Committee and Permian Basin Drilling Steering Committee.