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Fundamentals and
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Paraffin and Asphaltenes
- problem causes &
solutions

Well Productivity
Optimization

Specialist Instructor

Dr. Eduardo Luna
PhD. in Chemical Engineering from the University of Manchester
London United Kingdom

Eduardo is a PhD. in Chemical Engineering from the University of Manchester, and Bsc in Chemical Engineer from Universidad Nacional Autónoma Research Institute of Applied Mathematics and Systems México, is an specialist in Flow Assurance modelling Steady State and Transient multi-phase flow using OLGA and Maximus, to support field development plans, CCS, CO₂, H₂ water and geothermal transportation networks.

Chairman of Process Engineering Group (PEG) of the Society of Chemistry and Industry. SPE member with 16 years' experience in flow assurance for the oil and gas industry in North Sea and worldwide. His experience includes work with Xodus Group, Genesis Oil and Gas Consultants, McDermott International and Pace Flow Assurance. Currently he lectures in association with MineaOil Limited.

PhD Thesis: "Optimization of distributed parameter systems using transient simulators" under supervision of Prof. Kostas Theodoropoulos, Multi-scale Modelling and Optimization, Model Order Reduction.

Description

This training is designed to provide the participants with a deep understanding of the flow assurance fundamentals, practices, and field applications to predict, model and mitigate potential issues with the fluid of hydrocarbons in the production facilities onshore and offshore. The main areas to focus in the weeks are:

- Fluid flow principles, multiphase flow, slippage, frictions and heat transfer effects in the wellbore, pipelines, and pipelines are extensively presented and discussed in the training week.
- Hydrates, wax and asphaltene formation, deposits and mitigations methods essential in the preparation of filed development plans. This training includes practical field examples and exercises.

Objectives

- To improve or gain an in-depth familiarization of main Flow Assurance concepts (multiphase flow and production chemistry)
- Understand the paramount importance of the relationships of the reservoir-flowlines-topsides.
- Share project experiences.

Audience

- Flow Assurance, Process and Petroleum engineers,
- Facilities, Pipeline and Subsea Engineers,
- Staff involved in Reservoir Engineering and Simulation, Steady-State and Dynamic Simulation specialists and Production Chemists will find this training course very helpful as well.
- Consultants and Managers involved in field developments and flow assurance projects.
- This training can be done in house based on workshop sessions for groups of delegates with interest in understanding the flow assurance principles and methods; it can be tailored to specific company needs.



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Content

Day 1

What is a flow assurance system? Why is it important an overall approach modelling?

- Flow Assurance what can stop the flow
- Challenges
- Case Study
- Introduction to Reservoir Fluids
- Basic Reservoir/Subsurface concepts
- Reservoir behavior
- Introduction to Reservoir Fluids and PVT modelling
- Types of reservoir fluids
- Thermodynamic behavior
- Introduction to PVT characterization
- Basic laboratory experiments and simulations
- Basic EoS Characterization Black oil and Multicomponent

Day 2

Fluid Flow

- Single-Phase Flow Assurance
- Friction Factor, Laminar and Turbulent Flow
- Reservoir Fluids & Types
- Non-Newtonian Fluids and Multi-phase Flow Assurance
- Slippage, Liquid Holdup, Superficial Velocities, Mixture Density and Viscosity
- Homogeneous, the drift-flux and the two-fluid models. How do we solve them? Are they applicable for any scenario?
- Flow regimes, Slugging
- Heat Transfer, conduction, convection and radiation
- Heat transfer through composite layers
- Wellbore heat transfer, Pipeline heat transfer, Burial pipeline modelling
- Wellbore and pipeline heating
- Practical Session

Day 3

Production Chemistry

- Hydrates, Fundamentals, thermodynamic modelling and formation kinetics
- Wax and Asphaltenes Fundamentals,
- Wax appearance temperature (WAT), wax formation and deposition, asphaltene formation and deposition
- Scales, sand, corrosion and erosion
- Flow Assurance Prevention & Mitigation Strategies
- Issues during steady state & transient operating scenarios
- Typical flow assurance problems during normal operation and transient scenarios such shut down, cooling down, blowdown, restart, etc.
- Mechanical & Thermal Flow Assurance management – Review of the main flow assurance strategies from insulations to direct heating
- Chemical Flow Assurance Control – Review of the both thermodynamic and kinetic gas hydrate inhibitors. How can we calculate the amount required?
- Liquid slugging control – Consequences of slugging and review of typical flowline-riser severe slugging control.
- Practical Session



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Content (cont.)

Day 4

Introduction to Integrated Production Modelling

- Concepts & Challenges: From reservoir to Topsides
- Importance to consider all the components of the production system
- The rising importance of production facilities.
- What information can we obtain from it?
- Integrated Production modelling concepts, applications and examples
- Difference between reservoir focused and facilities focused Integrated Production Modelling

Day 5

Introduction to Flow Assurance Modelling Tools

- Discussion of flow assurance issues by delegates,
- Exchanging experiences and how this training course might help them.
- Key benefits of this training course
- Improve or gain an in-depth familiarization of main Flow Assurance concepts
- Multiphase flow and production chemistry
- Understand the paramount importance of the relationships of the reservoir-flowlines-topsides.
- Share project experiences
- Discussions and Case Studies
- Wrap Up

End of the training