arctic SOLUTIONS DMCC

INTEGRATED RESERVOIR ANALYSIS (IRA)

RSE042

COURSE OVERVIEW

PROSPER is a basic tool for any petroleum engineer. It models well performance at which the trainee will be able to make whatever sensitivities he/she want to optimize the production system and/or diagnose any problem. The Nodal Analysis is the fundamental method used by production engineers to study and evaluate wells. Nodal analysis is a technique to determine the flow condition of a well through two subsystems: "Inflow" and "outflow" defined by a "node" (point reference). Nodal analysis concepts apply to wells in natural flow, artificial lift wells to injection wells and for this reason it is important to understand the purpose, assumptions, phenomena involved and the limitations of the method.

COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand the fundamental concepts of nodal analysis and its application in reservoir analysis.
- Utilize PROSPER modeling tool to analyze well performance, optimize production systems, and diagnose problems.
- Apply GAP modeling techniques to analyze network behavior, identify bottlenecks, and ensure flow assurance.
- Perform tank modeling using MBAL to analyze reservoir dynamics, aquifer effects, and production history.
- Model fluid behavior using PVTP to determine phase envelopes, critical points, and fluid properties.
- Apply VLP correlations in nodal analysis and understand their significance in reservoir engineering.
- Effectively use advanced PROSPER modeling techniques for horizontal wells, multilayer reservoirs, and dual porosity systems.
- Implement integrated asset modeling (IAM) techniques by combining PROSPER, GAP, and MBAL to optimize reservoir performance.
- Conduct sensitivity studies, optimization analyses, and case studies to enhance reservoir performance.
- Demonstrate proficiency in data entry, quality control, and interpretation of results in various modeling tools.
- Apply the learned concepts and techniques to real-world scenarios through workshops and case studies.

WHO SHOULD ATTEND

- Petroleum engineers
- Production engineers
- Reservoir engineers
- Field engineers and technicians
- Managers and supervisors in the oil and gas industry
- Students and researchers in petroleum engineering
- Professionals interested in reservoir analysis and modeling

COURSE DURATION

5 Working Days

COURSE OUTLINES

Pre course evaluation.

LEVEL I: AWARENESS LEVEL

Part (1): Introduction to Nodal Analysis

- Fundamental Concepts
- Nodal Analysis
- IPR/VLP
- Impact of WC, GOR, Tubing Size and WHP
- Flow Regimes

Part (2): Fundamentals of PROSPER Modeling

- Introduction to PROSPER:
  - Data Entry
  - Data Needed
  - Deviation Survey
  - Surface Equipment
  - Geothermal Gradient
  - Well Models
  - Natural wells
  - Artificial Lift Method
  - ESP Overview
  - GL overview
  - Jet Pump Overview

Part (3): Fundamentals of GAP Modeling

- Network Modeling Using GAP:
  - Data Entry
  - Data Needed
  - Injection Fluids
  - Production Fluids
  - Emulsion Models
  - System Constraints
  - Facilities Modules

Part (4): Fundamentals of MBAL Modeling

- Tank Modeling Using MBAL:
  - Data Entry
  - Data Needed
  - Defining Tank Type
  - Monitoring Contact Option in MBAL
  - PVT Data Needed in MBAL
  - How to read PVT report?

Part (5): Fundamentals of PVTP Modeling

- Fluid Modeling Using PVTP:
  - Data Entry
  - Data Needed
  - Components Selection
  - Edit Model Percentage
  - PVT Fundamentals
  - PVT QC

LEVEL II: KNOWLEDGE LEVEL

Part (1): Nodal Analysis Concepts

- Data Sources, Preparation and QC
- IPR Models
- Vogel
- Frochheimer Models
- Fetckovich Models
- IPR for Gas Wells

Part (2): Fundamentals of PROSPER Modeling

Well Modeling Using PROSPER:

- IPR/VLP System
- Jones Model
- Multirate Jones Model
- Hydraulically Fractured Wells

Part (3): Fundamentals of GAP Modeling

- Network Modeling Using GAP:
  - Facilities Modules
  - Bottlenecks
  - Flow Assurance Aspects

Part (4): Fundamentals of MBAL Modeling

- Tank Modeling Using MBAL:
  - Aquifer Models
  - Carter Tracey Model
  - Small Pot
  - Schilthuis Model
  - Hurst Steady State
  - Hurst Van Everdingen Model
  - Case Study

Part (5): Fundamentals of PVTP Modeling

- Fluid Modeling Using PVTP:
  - PVT Important Concepts
  - PVT QC
  - Decontamination
  - Lumping
  - Delumping

LEVEL III: SKILL LEVEL

Part (1): VLP Correlations in Nodal Analysis

- VLP Correlations
- IPM/IAM Significance to Petroleum Engineers, Reservoir Engineer and Production Engineers.
- Data Sources, Preparation and QC

Part (2): PROSPER Modeling

- Well Modeling Using PROSPER:
  - Horizontal Wells modeling
  - Multilayer Reservoirs
  - Dual Porosity
  - SPOT Model
  - Well Configuration
  - Defining Xmas Tree
  - Defining Tubing in PORSPER
  - Defining SSSV in PROSPER
  - Defining Casing in PROSPER
  - Generating Inflow
  - Generating System 3 Variables and 4 Variables
  - Tubing Correlation Comparison
  - VLP-OPR Matching
  - Pipeline Matching

Part (3): GAP Modeling

- Network Modeling Using GAP:
  - Data Entry
  - Data Needed
  - Facilities Modules
  - Bottlenecks
  - Flow Assurance Aspects
  - Pipelines, Sources and Sinks
  - Gas Lift Optimizations
  - Sensitivity Study
  - Case Study
  - Workshop

Part (4): MBAL Modeling

- Tank Modeling Using MBAL:
  - Aquifer Models
  - Fetkovich Model
  - Vogt Wang

- Hurst Van Everdingen Modified
- Rock Compressibility
- Pore Volume vs Depth
- Fractional Flow
- Production History Entry

Part (5): PVTP Modeling

- Fluid Modeling Using PVTP:
  - Phase Envelope
  - Critical Point
  - Saturation Pressure
  - Constant Composition Expansion , CCE
  - Constant Volume Depletion, CVD
  - Differential Expansion
  - Swelling
  - Slim Tube

Part (6): Integrated Asset Modeling (IAM) Fundamentals

- Combing PROSPER, GAP and MBAL into IAM
- Integrated Asset Modeling (IAM) Workflow and Case Study
- Workshop

Post course evaluation.