NODAL ANALYSIS RSE041

COURSE OVERVIEW

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 and principles of Nodal Analysis.
- Utilize Integrated Production Modeling (IPM) and Nodal Analysis techniques for production optimization.
- Effectively use PETEX software for Nodal Analysis.
- Develop Inflow Performance Relationship (IPR) models and Vertical Lift Performance (VLP) correlations.
- Collect, prepare, and quality control (QC) data for Nodal Analysis.
- Perform well modeling using PROSPER software, including data entry, curve exportation, and rate estimation.
- Conduct sensitivity studies and analyze case studies related to Nodal Analysis.
- Apply GAP modeling techniques for network modeling, including data entry, bottleneck identification, and flow assurance considerations.
- Optimize gas lift operations using Nodal Analysis and GAP modeling.
- Gain proficiency in MBAL modeling, including tank modeling, PVT data analysis, history matching, and prediction modes.
- Develop fluid models using PVTP modeling, considering phase envelopes, critical points, and wax points.
- Understand the significance of Integrated Asset Modeling (IAM) and combine PROSPER, GAP, and MBAL into an IAM workflow.
- Apply IAM techniques to real-world case studies and workshops.

WHO SHOULD ATTEND

This course is intended for junior and experience production, reservoir, operation, petroleum and field engineers in addition to other geoscientists who seeks to have more knowledge on production optimization using Nodal analysis approach.

COURSE DURATION

5 Working Days

COURSE OUTLINES

1. Pre course evaluation

2. Introduction to Integrated Production Modeling (IPM) and NODAL Analysis
   - Fundamental Concepts
   - Introduction to PETEX software
   - Fundamentals of Nodal Analysis
   - IPR Models
   - VLP Correlations
   - IPM/IAM Significance to Petroleum Engineers, Reservoir Engineer and Production Engineers.
   - Data Sources, Preparation and QC

3. Fundamentals of PROSPER Modeling
   - Well Modeling Using PROSPER:
     - Data Entry
     - Data Needed
     - Well Models
     - IPR/VLP System
     - Well Configuration
     - Exporting Curves to Other Software Packages
     - Rate Estimation
     - Sensitivity Study
     - Case Study
     - Workshop

4. Fundamentals of 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

5. **Fundamentals of MBAL Modeling**

- Tank Modeling Using MBAL:
  - Data Entry
  - Data Needed
  - PVT Data
  - Aquifer Models
  - Transmissibility
  - Tanks Models
  - Relative Permeability
  - Fractional Flow
  - History Match
  - Analytical Models
  - Prediction Modes
  - Sensitivity Study
  - Case Study
  - Workshop

6. **Fundamentals of PVTP Modeling**

- Fluid Modeling Using PVTP:
  - Data Entry
  - Data Needed
  - PVT Fundamentals
  - PVT QC
  - Decontamination
  - Lumping Delumping
  - Phase Envelope and Critical Point
  - Wax Point
  - EoS Modeling and Matching
  - Reporting
  - Case Study
  - Workshop

7. Integrated Asset Modeling (IAM) Fundamentals
    - Combing PROSPER, GAP and MBAL into IAM
    - Integrated Asset Modeling (IAM) Workflow and Case Study
    - Workshop
8. Post course evaluation