



Near Wellbore Production Problems and Well Stimulation

Course Description

This course is designed to provide fundamental knowledge about near wellbore production problems and its solutions via well stimulation. This course covers the essential principles related to well damage identification, type of damage, flow assurance problems as well as technologies for well stimulations.

This course includes theory, applications, and case studies related to fines migration, sand production problems, wettability changes, water control, emulsion control, wax, asphaltene, hydrate, and scale removal solutions, hydraulic fracturing, and acid stimulation.

A chapter related to well tests analysis is included to show how skin factor can be estimated from transient well tests. A chapter of Nodal Analysis to estimate well productivity, perform skin sensitivities, and candidate selection for well stimulation is also included in this course. Main laboratory tests will be analyzed to show the importance of rock and fluids characterization on damage estimation.

The course will be supplemented by practical class project example problems, group exercises and interactive group discussion designed to consolidate and reinforce learning and identify and offer solutions to specific problems associated with Well Stimulation Design and Deployment of oil fields.

Who Should Attend?

This course is designed for petroleum, production engineers, integrated study members, production operations Engineers, geologist, petrophysicist, assets managers, reservoir engineers, reservoir managers, facility engineers, managers, and others engineers seeking knowledge in production engineering and well stimulation.

What You Will Gain:

- Understanding the mechanisms of formation damage and their solutions
- Learning the theory and application of transient well tests, and how we can use it to estimate skin factor, average reservoir permeability and average reservoir pressure.



- Learning how to apply the nodal analysis concepts to determine well productivity and quantifying formation damage.
- Learning the theory, main applications, and case studies of hydraulic fracturing, acid stimulation, wettability changes, sand production problems, water production problems, emulsion, wax, asphaltene, hydrates, and scale problems.
- Applying formation damage and productivity index knowledge to select the best candidate for well stimulation
- Understanding the mechanisms of sand production and the technologies to control and manage sand production.
- Learning best practices to prevent formation damage

Training Methodology

The training course will combine lectures (30%) with workshop/work presentations (30%), interactive practical exercises and case studies (20%), supported by video material, software and general discussions (20%)

Course Content

Overview of formation damage

- Mechanisms of formation damage
- Formation damage vs. pseudodamage
- Types of formation damage
- Overview of formation damage solutions
- Overview of Transient Well Test

Nodal Analysis to determine well productivity. Quantifying formation damage, formation damage sensitivity analysis

- Overview of Nodal analysis
- Review of reservoir inflow performance modeling (IPR)
 - Reservoir deliverability
 - Flow regimes: steady state, transient flow, pseudo-steady state
 - Reservoir models: Darcy, Vogel, Forchheimer, others
 - Types of well architecture,
- Review of vertical lift performance modeling (VLP)
 - Fluid flow modeling in pipes
 - Heat flow modeling
 - Sensitivity analysis
- Production system matching



- Nodal Analysis Exercises: Hydraulic Fracturing, acidizing, horizontal well stimulation, gravel pack.

Geomechanics for sand production problems and Hydraulic Fracturing

- Well productivity degradation due to sand production
- Sand Production Management
- Challenges in understanding sanding
- Geomechanics for sand production problems
 - Forces on a sand grain
 - Numerical models predicting sand production
 - Effect of two-phase flow in sand production
 - Sand Transport
- Sand control techniques
- Determination of onset of sanding
- Overview of Hydraulic Fracturing
- Overview of acidizing, design considerations, types of acids,
- Hands on exercises (gravel pack design, critical stability envelop, onset sanding prediction, hydraulic fracture effect on productivity index)

Overview of flow assurance problems

- Overview of Flow assurance problems
 - Flow assurance consideration for onshore and offshore projects
 - Flow assurance problems, phase envelope
 - Laboratory data required for fluids characterization
 - Formation water characterization
- Hydrate formation
 - Hydrate behavior with pressure
 - Process of hydrate precipitation
 - Hydrate removal options
- Wax deposition
 - Wax behavior with pressure
 - Process of wax precipitation
 - Wax removal options
- Asphaltene
 - Asphaltene behavior with pressure
 - Process of asphaltene precipitation
 - Asphaltene removal options
- Scale deposition
 - Scale behavior with pressure
 - Process of scale precipitation
 - Scale removal options



- Well completion considerations and artificial lift selection to avoid flow assurance problem
- Hands on exercises

Reservoir Monitoring, Candidate Selection methodology and risk analysis

- Fundamentals of reservoir monitoring
 - Reservoir Performance, flow rates, pressure, temperature
 - Tracers
 - Main Dashboard and KPI
- Candidate selection methodologies
- Risk management of near wellbore production problems
- Hands on project to implement formation damage lesson learned

