

Advanced Well Test Analysis

Course Description

This five days short course will equip participants with the principles of advanced well test analysis to improve interpretation skills by developing key reservoir parameters from well pressure transient tests. Emphasis will also be placed on the importance of preparation; supervision of well tests; data retrieval; quality check; and interpretation methods; applicable to vertical and horizontal wells in homogeneous, layered, fractured, and compartmentalized reservoirs. In addition, the application of state of the art interpretation classical and computer-aided methods will be described, supported with field examples for the different well test types such as drawdown, buildup, fall-off, interference, pulse, injection and DST's. Interpretation methods: Horner, Log-Log, type curves, will also be illustrated with practical examples.

Course Objectives

By the end of this short course, participants would have

- Learnt the theory, applications, and practical limitations of well tests; understood the reservoir response under production injection disturbances and how to interpret a well test.
- Gained knowledge on concepts to understand well transient tests in naturally fracture reservoirs; and gas wells test design and interpretation.
- Understood naturally fractured carbonates and basemen reservoirs, storability, matrix fracture porosity partition coefficients. Interference and pulse tests.
- Learnt the principles of reservoir limit tests, productivity index, calculation of horizontal and vertical permeability, DST tests, and interference tests.
- Gained skills to understand well tests in horizontal wells and horizontal fractured wells, principles of de-convolution and well tests modeling.

Who Should Attend

This course is suitable for:

- Engineers (well completion engineer, production engineers, reservoir engineer and field engineer), well-site geologist, and other staffs from operations, services and consultants involved in Petroleum Production process.

- Engineers and technical personnel involved in appraisal or field development, reservoir manager intending to enhance their technical skills and level of confidence in decision making by identifying well issues, causes of production anomalies and operational constraints etc.
- Engineers and earth scientists involved in well and formation characterization and reservoir surveillance.
- Reservoir and production engineers, geoscientists and managers involved in well testing for formation evaluation and production optimization.

Course Content

DAY 1

Introduction and Objectives. Buildup's and Draw Dawn Tests.

- Introduction to Well pressure transient Tests
- Well test in Exploration, Appraisal and Development Wells
- Darcy Law, Diffusivity equations,
- Transient, pseudo steady and steady state.
- Pressure Buildup and Drawdown tests
- Horner Plots, Equivalent producing time, Radius of investigation
- Wellbore Storage, Skin factors, Productivity Index
- Reservoir Boundaries and Channels

Day 2

Transient Pressure Tests, Fractured Reservoirs, Gas wells

- Naturally Fracture Reservoirs Overview
- Induced Fractures and Fractured Wells
- Interpreting fractured wells, Linear flow,
- Elliptical flow, fracture length, conductivity and geometry
- Gas wells Test
- Diffusivity, Darcy equation for gas wells
- Maximum Open Flow Gas Potential, Deliverability tests, isochronal tests.

Day 3

Naturally Fractured Carbonates and Fractured Basement Diagnosis

- Carbonate reservoirs and fracture basement reservoirs
- Types of Naturally Fractured Reservoirs
- Pseudo-steady state and unsteady state matrix flow models
- Storability and Porosity Partition coefficient
- Fracture porosity from well logs, cores and well test analysis
- Pressure derivative

Day 4**Multiphase Flow, Multi-rate Tests, Partial completions and Mechanical Skin and Interference**

- Multiphase Flow, Multi-rate tests
- Mechanical Skin
- Partial completion
- Drill Stem Test (DST), applications and limitations
- Spherical flow, vertical and horizontal permeability
- Interference and pulse tests

Day 5**Special Tests Horizontal and slanted well Tests**

- Horizontal and slanted well tests, directional permeability's
- Hydraulic fracture in horizontal wells and well test interpretation
- De-convolution techniques and applications
- Well tests modeling
- Examples of field cases