

N989: Unconventional Reservoir Rate-Transient Analysis

Instructor(s): Chris Clarkson

Format and Duration

Classroom - 3 Days

Virtual - 6 Sessions

Summary

Business Impact: Rate-transient analysis (RTA) is a reservoir engineering method used to extract important **hydraulic fracture** and **reservoir parameters** and **fluid-in-place estimates** that can be used in **development planning and for reserves estimation**.

This course provides petroleum engineers and geoscientists with a comprehensive review of rate-transient analysis (RTA) methods as applied to unconventional reservoirs such as shale. Using the framework of a comprehensive workflow for quantitative RTA, the fundamentals of RTA, as applied to low-permeability oil and gas reservoirs exhibiting simple reservoir and fluid characteristics, are first reviewed. Next, application of RTA methods to unconventional reservoirs exhibiting complexities such as multi-phase flow and stress-dependent permeability is demonstrated. Throughout the course, practical application of RTA methods is illustrated using field cases.

Learning Outcomes

Participants will learn to:

1. Identify and appraise typical flow regimes for hydraulically-fractured vertical wells and multi-fractured horizontal wells (MFHWs).
2. Develop an understanding of the origin of RTA models.
3. Perform corrections for variable operating conditions and fluid properties.
4. Perform straight-line and type-curve analysis to derive fracture/reservoir properties and fluid-in-place.
5. Develop an understanding of how unconventional reservoir properties may be incorporated into RTA models.
6. Utilize a rigorous workflow for the analysis of unconventional reservoir production data.

Training Method

A virtual classroom course divided into six webinar sessions (equivalent to a three-day classroom course), comprising lectures, discussion, case studies, and practical exercises to be completed by participants during sessions.

Who Should Attend

This course is designed for petroleum engineers and geoscientists who wish to learn the state-of-the-art in RTA as applied to unconventional reservoirs.

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Prerequisites and Linking Courses

Participants should have a solid background in basic reservoir engineering, including well-test analysis. Knowledge of unconventional reservoirs (e.g., shale) is a bonus. Related courses include N973 (Reservoir Engineering for Unconventional Gas and Tight Oil Reservoirs) and N986 (Reservoir and Production Engineering of Resource Plays).

Course Content

Session 1

- Introduction
- Course Learning Objectives
- Fundamentals of RTA

Session 2

- Fundamentals of RTA (cont'd)
- RTA Workflow
- Preparing and Assessing Data

Session 3

- Flow-Regime Identification
- Straight-Line Methods

Session 4

- Straight-Line Methods (cont'd)
- Type-Curve Methods
- RTA for Coalbed Methane Reservoirs

Session 5

- RTA for Shale Gas Reservoirs

Session 6

- RTA for Multiphase Tight/Shale Reservoirs
- Numerically-Enhanced RTA