

Applied Capillary Pressure and Saturation Height Modeling

Course General Description:

The course aims to increase the knowledge of the geologists, engineers and the others who are working in the reservoir characterization aspect. It is applied course shows how to use the capillary pressure P_c data to help the trainees to check the main factors controlling the oil and water distribution in the reservoir, and the importance of the pore spatial distribution. The course starts with an overview of the reservoir rock properties and reservoir fluids. This is an essential factor as a background for checking the factors affecting the pore fluids distribution. Case studies and workshops are used to show the challenges associated with interpreting the available data distributions to understand why it is necessary to examine the capillary pressure, HPMI, lab NMR, thin-sections and SEM images. Both clastics and carbonate examples and core-log integration workshops are used to checking how simple saturation height models can be applied in fields to study many parameters as fluid contacts, hydrocarbon column height (above the free water level) and help you determine the dominant oil water contact (OWC). By the end of the course, the attendees will be able to evaluate the clastic and carbonate reservoirs and assess their performance. The comprehensive course documentation has been designed as a useful guide for future reference.

Audience:

This course is designed for:

1. Geologists
2. Petroleum Geologists
3. Geophysicists
4. Wellsite geologists
5. Drilling engineers
6. Stratigraphers
7. Geochemists,
8. Petroleum engineers
9. Production Engineers
10. Petrophysicists.

Course objectives:

By end of the course participants will learn:

- Realize the importance of capillary pressure and its applications.
- Describe pore geometry using petrographic and SEM studies.
- Describe drainage and imbibition processes.
- Establish fluid saturations.
- Know more about the practical applications of determining the free water level (FWL).
- Check the different capillary pressure lab methods and data acquisition.
- Check the lab data analysis will focus on lab-based pore throat radius
- Estimate the pore throat radius from porosity and permeability.
- Know how to convert the Lab measured capillary pressure data to reservoir conditions to determine height above free water.
- Estimate the seal capacity and initial water saturation.
- Know more about Petrophysical rock typing based on the high pressure mercury injection data.

- Construct the saturation height capillary model based on petrophysical rock typing.
- Know about the saturation height model based on Leverett, Gunter/Smart, and the modified Thomeer methods.

Course Duration:

5 days

Course Location:

Dubai

Course contents:

Module 1: Pore Types and Description

- o Introductory discussion on importance of capillary pressure and rock typing
- o Different pore types, fabric and description using petrography.
- o Application of Scanning Electron Microscopic Images to check pore fabrics and factors controlling it.
- o Different Lab methods that applied to check pore geometry
- o Case Studies and workshop.

Module 2: Drainage and Imbibition Curve

- o Drainage and Imbibition studies.
- o Applications of Drainage Capillary Pressure Analysis (OWC, GWC, and FWL)
- o Applications of Imbibition Capillary Pressure Analysis (Production Trends and Residual Saturation)
- o Lab Methods to Determine Capillary Pressure.
- o Case Studies.
- o Workshop.

Module 3: Lab Methods for Determining the Capillary Pressure

- o Determining Pore Throat Radius from Lab Data and Estimating Pore Throat Radius from k and phi.
- o Porous Plate Method
- o Centrifuge Method
- o Dynamic Fluids Method
- o High Pressure Mercury Injection
- o Workshop

Module 4: Converting the capillary pressure data to height above FWL

- o Height above the free water level.
- o Case studies and workshop.
- o Common Applications of the capillary pressure (Thomeer and Leverett J Function)
- o Case studies and workshop.
- o Petrophysical Rock Typing.
- o Case studies and workshop

Module 5: Constructing the saturation height model based on rock typing

- o Constructing the saturation height model.
- o Reservoir characterization and borehole Analysis.
- o Capillary Pressure, NMR and Core-Log Integration.
- o Workshop and closing session.

Methodology:

- 50% lectures & concepts
- 10% Videos

- 20% Case studies
- 10% Exercises
- 10% Discussions

Course code: (TEXP001)