Iran section

SPE-Iran Section Technical Workshop

An Integrated Solution for Reservoir Permeability Prediction

Workshop Overview

Numerous examples and case studies from various marketing Permeability, the single-phase fl uid conductivity of a porous material is a key parameter in determining the value of a hydrocarbon accumulation. It is a complex interplay of porosity, pore connectivity, grain packing, grain size and rock diagenesis. The permeability of rocks varies signifi cantly from several nano-darcies for shales to several darcies for extremely good reservoir rocks. Our ability to predict the magnitude and range of permeability in undrilled areas is rather poor. Thus, it is important to establish geostatistical reservoir modelling to obtain an idea of the permeability distribution within a reservoir using a combination of the geophysical, geological, petrophysical and conceptual models. However, to have a realistic model, the magnitude of permeability must be available at least at the well locations.
It is undoubtedly that permeability is one of the most important and critical petrophysical properties which determine the economic value of a reservoir. Prediction of permeability in un-cored sections or wells is a prerequisite for any integrated reservoir studies. Due to its elusive nature and important role in reservoir studies, several methods have been proposed for the purpose of permeability prediction. Selection of proper model will of course not only affect the success of the task of permeability estimation, but also determines the usefulness of estimated permeability. This course will describe several methods for permeability estimation in detail along with some practical applications of these methods.

- Basic concepts of permeability
- Permeability classifi cation
- Permeability controlling parameters

METHODS FOR PERMEABILITY PREDICTION

- A general review on the different methods for permeability prediction
- A review on the empirical equations for permeability prediction

POROSITY AND ROCK FABRIC/FACIES/ELECTROFACIES APPROACH FOR PERMEABILITY ESTIMATION

- Permeability –porosity relationships
- Application of rock fabric/facies/electrofacies concepts in permeability estimation

FLOW ZONE INDICATOR (FZI) AND HYDRAULIC FLOW UNIT (HFU) APPROACH

Defi nition of FZI and HFU
Permeability estimation using FZI approach

3D IMAGE ANALYSIS APPLICATION TO ACQUIRE FORMATION PERMEABILITY

Concept of 2D and 3D image analysis
Acquisition and Applications of 3D image analysis
Permeability from 3D image analysis

PERMEABILITY ESTIMATION USING FULL WAVE SONIC LOG DATA

Introduction to sonic waves
Permeability from borehole stoneley-wave

PERMEABILITY FROM NUCLEAR MAGNETIC RESONANCE (NMR)

Introduction to Nuclear magnetic resonance (NMR)
Permeability calculation from NMR log

APPLICATION OF MERCURY INJECTION CAPILLARY PRESSURE DATA FOR PERMEABILITY ESTIMATION

Introduction to capillary pressure and mercury injection
Interpretation and applications of mercury injection curves
Permeability calculation from mercury injection-capillary pressure curve

ARTIFICIAL NEURAL NETWORKS (ANN)

Introduction to soft computing
Basics of ANN and how it works

APPLICATION OF LOG DATA AND ANN TO PREDICT PERMEABILITY

Selection criteria for network inputs
Network design
Permeability from ANN

MULTI-REGRESSION ANALYSIS TO ESTIMATE PERMEABILITY

Introduction to Multi-regression analysis
Permeability from Multi-regression analysis
Comparison between Multi-regression analysis and ANN results

PRACTICAL WORK ON A SET OF REAL DATA USING AN ANN SOFTWARE

A set of log data and core permeability will be used in class to apply ANN and Multi-regression analysis methods to predict permeability

Who Should Attend

This workshop is specially designed for professionals involved in reservoir characterization. It is highly applicable for individuals from all subsurface disciplines. These include:

- Geophysics
- Petrophysics
- Geology
- Geomodeling
- Reservoir, and petroleum engineering

Why You Should Attend

Permeability is one of the most important and critical petrophysical properties to determine the economic value of a reservoir. Prediction of permeability serves as a platform and prerequisite for any integrated reservoir studies. This workshop is tailor made specifi cally to bring the highlights of recent technologies and developments on integrated solution for reservoir permeability prediction. Establish solid understanding of permeability prediction using a combination of the geophysical, geological, petrophysical and conceptual models to achieve maximum value of your reservoir.