

UNCERTAINTY ANALYSIS OF RESERVOIR MODELS

Featuring the Application of “Workflow Editor”

LDI Instructor

Introduction

Uncertainty Analysis is an integral part of Reservoir Modeling process to capture various uncertainties that influence the quality and accuracy of a reservoir model. Uncertainty is a function of our state of knowledge. From velocity models to fluid contact depths, facies porosity, and permeability distributions, faults and fractures, we have knowledge gaps in understanding our reservoirs.

To analyze the uncertainty of reservoir models, engineers have used various procedures. The state-of-the-art technology in this area is the use of Workflow Editor. With Workflow Editor, multiple models can be generated according to certain sampling procedure, either deterministically (Experimental Design Technique) or stochastically (Monte Carlo Technique). Additionally, this program can also be used to repeat various tasks, such as updating new well data or new seismic interpretation, automatically. Having the skill to program with Workflow Editor will enhance the work efficiency of a reservoir modeler.

In this practical course, you will learn how to build and execute the workflow for quantifying the uncertainty. The course consists of 25% theory with 75% practice. Experience in building base case of 3-D reservoir model is needed in order to get full advantage of the course. All exercise will be demonstrated using PETREL software.

BENEFITS OF ATTENDING

- Understand the issues related to uncertainties of reservoir model and method to quantify them.
- Be able to prepare a base case model and identify the uncertainty of each component.
- Learn how to use Workflow Editor in reservoir modeling

- Know how to build workflow for static uncertainty analysis in order to get the P10, P50 and P90 values
- Understand the sampling techniques of Deterministic and Stochastic methods
- Become familiar with Uncertainty Analysis, Sensitivity Analysis and Proxy Modeling

Course Content

Introduction

- What is Uncertainty Analysis?
- Reasons to quantify the uncertainty of reservoir models
- When should we do the analysis?
- Who should perform the analysis?
- How do we do the uncertainty analysis
- What is Workflow Editor?
- Can we simply use the automatically generated workflow?
- Why do we need to customize the workflow?
- What is needed to be able to customize the workflow?

Review of Base Case Model Development

- Structural Modeling
- Facies Modeling
- Porosity and Permeability Modeling
- Saturation Modeling

Programming with Workflow Editor

- General computer programming
- Programming with Workflow Editor
- Examples of Workflow Programming for General Reservoir Modeling Purposes
- Automatically generated workflow for uncertainty analysis
- Customizing Workflow Editor for Uncertainty and Sensitivity Analysis

Static Uncertainty Analysis (Volumetric – P10, P50, P90)

- Defining uncertainty of variables
- Sampling Techniques :
 - Deterministic Sampling using Experimental Design
 - Stochastic Sampling using Monte Carlo Technique
- Results Evaluation using Histogram Plots and Volume Report to get the P10, P50 and P90 values
- Reproduction of reservoir model corresponds to the P10, P50 and P90 realizations

Dynamic Uncertainty Analysis Workflow and Dynamic Ranking

- Simulation Uncertainty Analysis
- Example of Workflow for Dynamic Uncertainty Analysis
- Use of Dynamic Ranking as alternative for Simulation Uncertainty Analysis
 - Streamline Simulation Technique
 - Fast Marching Method

Proxy Modeling

- Introduction to Proxy Modeling
- Use of Proxy to Screen Sensitivity: Algorithm, Training, Design Matrix, Validation, Evaluation and Plotting the Results

Who Should Attend

- Reservoir Modelers
- Reservoir engineers
- Geologists
- Geophysicists
- Petrophysicists
- Reservoir Simulation Engineers

COURSE DELIVERY

- This course will be delivered face to face(offline)
- Participants will receive course material before the training.
- Participants will receive a certificate after the training.
- Training time is from 08:00 to 16:00 WIB with several breaks in between.

TRAINING CONFIRMATION

LDI Training will provide a Confirmation Letter after we receive registration according to the required quota.

For more information please contact

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