

Lecture 1 summary

Introduction to Reservoir Simulation

Terminology and definitions:

A simulation is the process of using a model to study the behavior of an actual or theoretical system by manipulating variables that cannot be controlled in a real system. Simulations allow evaluating a model to optimize system performance or to make predictions about a real system. Simulations are useful to study properties of a model of a real-life system that would otherwise be too complex, too large/small, too fast/slow, not accessible, too dangerous or unacceptable to engage.

While a model aims to be true to the system it represents, a simulation can use a model to explore states that would not be possible in the original system.

Modeling is the act of building a model.

A model is a product (physical or digital) that represents a system of interest. A model is similar to but simpler than the system it represents, while approximating most of the same salient features of the real system as close as possible.

A model can be a physical model (for example a physical architectural house scale model); or a conceptual model (for example a computer model, a statistical or mathematical model, a business model).

Reservoir simulation is the use of computer programs to solve reservoir flow problems flow modeling within the context of the reservoir management function.

Reservoir flow modeling is the best methodology available for achieving the primary reservoir management objective for hydrocarbon reservoirs.

Reservoir simulation goals:

Coordinate Reservoir Management Activities

Evaluate Project Performance

Select and Optimize Project Design

Estimate Project Life

Model Sensitivity to Estimated Data

Predict Recovery versus Time

Compare Different Recovery Processes

Plan Development or Operational Changes

Maximize Economic Recovery

Disciplines contributed to reservoir simulation:

The computer simulation system (simulator) is usually multi-component, multidimensional software package. its input data set is the reservoir flow model (reservoir geological model).

The flow simulator has been the point of contact between Many different disciplines (Figure1).

Integrated reservoir information and concepts are quantified in the reservoir simulator.

Modern simulation studies are performed by teams of specialists from different disciplines.

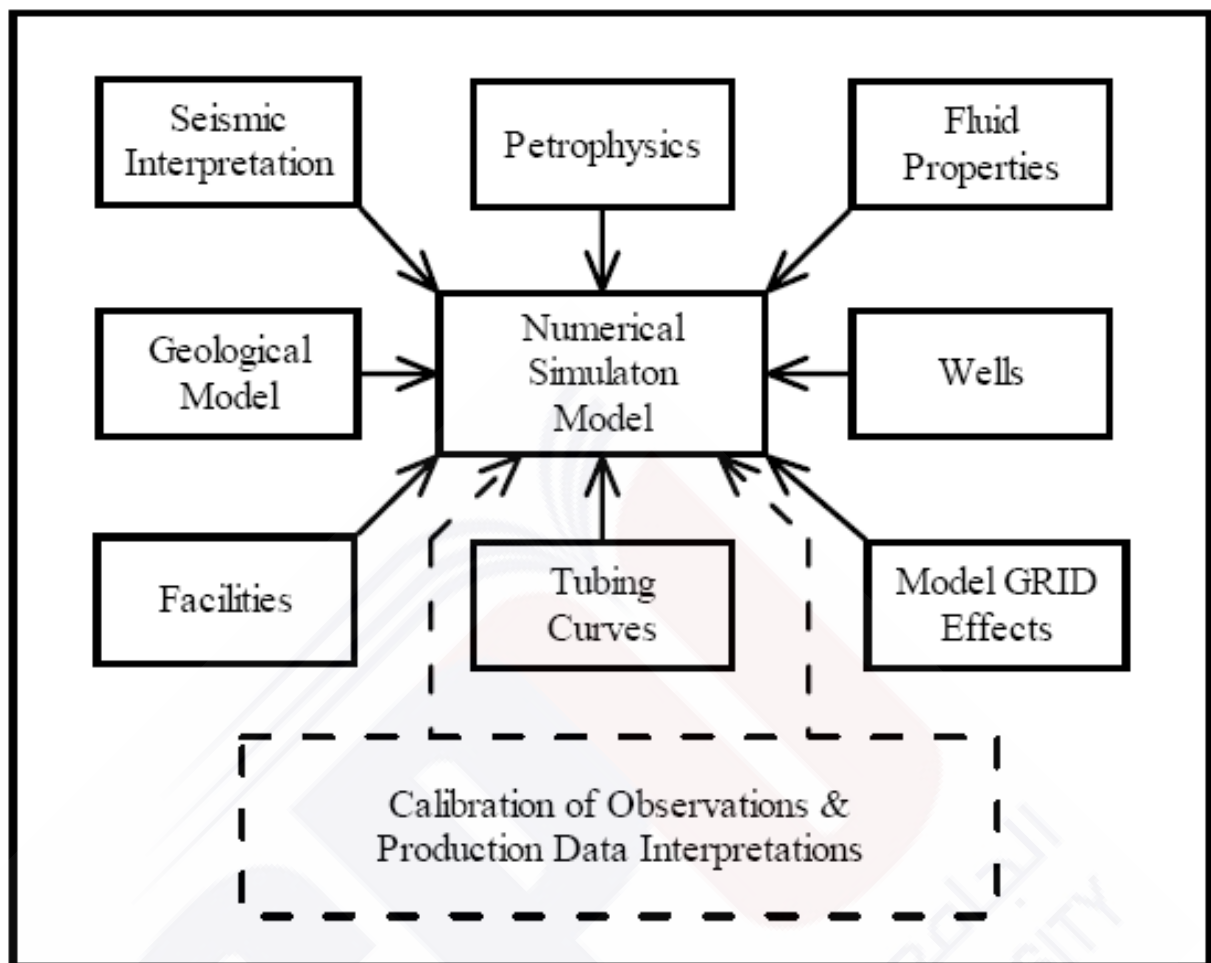


Figure 1. Disciplinary contributions to reservoir simulation