

**A Short Course for the
Oil & Gas
Industry Professionals**

SURROGATE RESERVOIR MODELS - SRM

Getting Maximum Return on the Reservoir Modeling Investment

*This Course is Designed for engineers and scientists involved in reservoir modeling and reservoir management. It focuses on application of **Artificial Intelligence & Data Mining (AI&DM)**, in Reservoir Engineering, Simulation and Modeling.*

*SRM is a replica of full field reservoir simulation models that accurately reproduces simulation model's outputs in Real-Time. SRM outputs include rate or pressure profiles at all wells & pressure and saturation distribution at all grid blocks. SRM has been successfully tested with **ECLIPSE™, IMEX™, GEM™, and POWERST™** with models of up to 6.5 million grid blocks.*

Course Description:

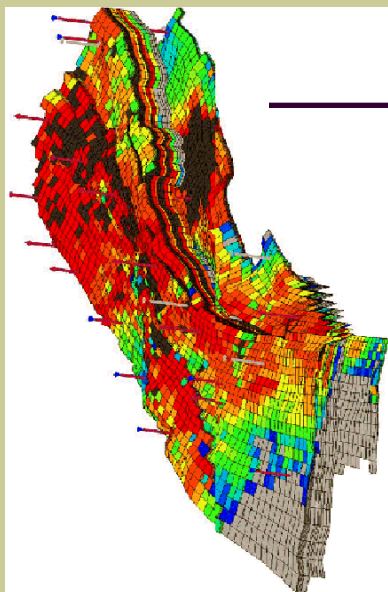
This short course will cover the fundamentals of artificial intelligence and data mining (AI&DM) and will provide the theoretical background for its most used components such as artificial neural networks, genetic optimization and fuzzy logic.

This course will provides a comprehensive overview of design, construction, training, history matching and validation of Surrogate Reservoir Models. The course will also cover the use of SRM in performing Fast Track Reservoir Analysis, Comprehensively Exploring the Solution Space and Quantification of Uncertainties associate with the geological (static) models.



INTELLIGENT SOLUTIONS, INC.

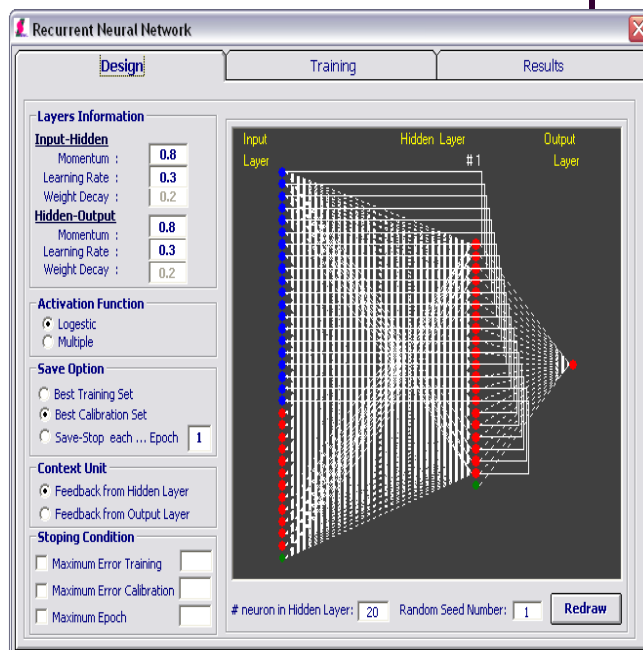


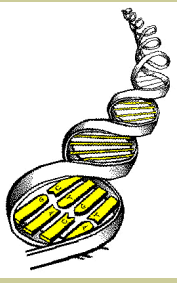


Intelligent Solutions, Inc. introduces a revolutionary and innovative solution for fast track, comprehensive reservoir analysis (solving both direct and inverse problems) using existing reservoir simulation models. Named Surrogate Reservoir Models; SRM is defined as *replica* of the full field reservoir simulation model that runs and provides accurate results in real-time (one simulation run takes only a fraction of a second). SRM mimics the capabilities of a full field model with high accuracy both at the well and at the grid blocks.

Surrogate Reservoir Model: SRM is developed to address the ever growing need in the oil and gas industry to perform accurate, but high speed simulation and modeling. Unlike conventional geo-statistical approaches (response surfaces, proxy models ...) that require hundreds of simulation runs for development, SRM is developed only with a few (from 10 to 30 runs based on the size of the model and number of wells) simulation runs. SRM can be developed regularly (as new versions of the full field model become available) off-line and can be put online for real-time processing to guide important decision making.

SRM has proven its value in the field by accurately replicating some of the most sophisticated reservoir simulation models including giant oil fields, coal bed methane reservoirs and CO₂ sequestration models. SRM is instrumental in comprehensive fast track reservoir analysis and quantification of uncertainties associated with the geological (static) models.





Who Should Attend?

This course is designed for reservoir engineers and geoscientists that are involved in all aspects of Reservoir Simulation and Modeling.

Every participant in the short course will receive:

- A Course Manual including all the slides used during the presentation of the short course.
- An electronic copy of all the slides.
- Electronic copy of technical material as support for the topics covered in the short course. This technical material takes you beyond the summarized slides and help you review in detail all you have learned in the short course.
- In some cases a copy (full features with limited time license) of Impact™ software applications will be provided (please ask about this option during the scheduling of the course). Impact™ is the software application developed by ISI for Surrogate Reservoir Modeling.

Course Outline:

Part One:

Artificial Intelligence & Data Mining (AI&DM); Theoretical Background.

Part Two:

Brief Review of Reservoir Simulation & Modeling.

Part Three:

Surrogate Reservoir Models—SRM

Definition and specifications

SRM in the Context of Comprehensive Analysis of Solution Space

SRM in the Context of Smart Field

SRM in the Context of Real-Time Reservoir Management

Starting the Construction of Surrogate Reservoir Models (SRM)

Identification of the Objectives

Understanding the Reservoir Model

Design of Runs

Generating Dynamic Data Set

Understanding the Field Geology

Generating the Static Data Set

Compiling the Complete SRM Data Set

Building the Surrogate Reservoir Models (SRM)

Identification of Key Performance Indicators (KPI)

Data Partitioning

Training, Calibration and Validation of SRM

Post-Processing and Analysis of the Surrogate Reservoir Models (SRM)

Sensitivity Analysis

Single Parameter Sensitivity Analysis

Multi Parameter Sensitivity Analysis

Quantification of Uncertainties

Type Curve Generation

Field Development Strategies

Part Four:

Software Application .





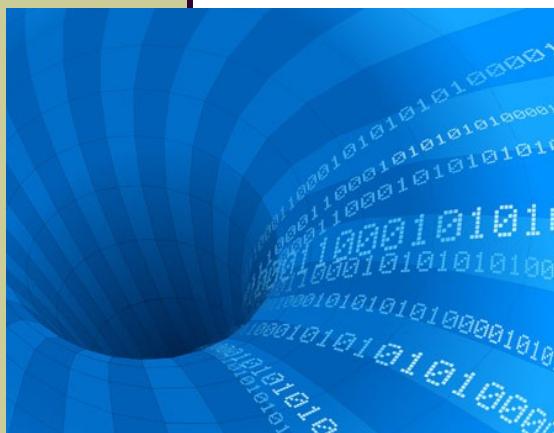
ABOUT THE INSTRUCTOR

Dr. Shahab D. Mohaghegh is professor of Petroleum & Natural Gas Engineering at West Virginia University and founder and president of Intelligent Solutions, Inc., the leading company in providing the oil and gas industry with solutions based on artificial intelligence & data mining (AI & DM).

With more than 18 years of experience, Dr. Mohaghegh has been a pioneer in the application of "AI&DM" in petroleum industry, applying hybrid forms of neural networks, genetic optimization and fuzzy logic to smart wells, smart completions, and smart fields as well as to drilling, completion, well stimulation, surface facility optimization, formation evaluation, seismic inversion, reservoir characterization, reservoir simulation and reservoir management.

He has published more than 100 technical papers during his career and has been a technical editor/reviewer for various SPE journals as well as other petroleum-related publications such as Oil, Gas and Coal Technology, Journal of Petroleum Science and Engineering, Computers & Geosciences, Geophysics, and Energy & Fuels. His technical articles on the application of "AI&DM" in the oil and gas industry and their recent developments have appeared in the Distinguished Author Series of SPE's Journal of Petroleum Technology during September, October and November of 2000 as well as the April 2005. He is a SPE Distinguished Lecturer for 2007-2008. He is an associate editor of SPE Reservoir Evaluation and Engineering Journal 97-99, & 2007- present. He has also served as chair, Steering committee member and discussion leader in SPE forums and has served as a steering committee member in SPE Applied Technical Workshops. He has been a panelist in several international conference discussing topics related to "AI&DM" and smart fields. He has served in U.S. Secretary of Energy's Advisory Committee on Unconventional Resources Technology in two administrations.

Shahab D. Mohaghegh holds B.S. and M.S. degrees in Natural Gas Engineering from Texas A&I University and Ph.D. in Petroleum & Natural Gas Engineering from The Pennsylvania State University.



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