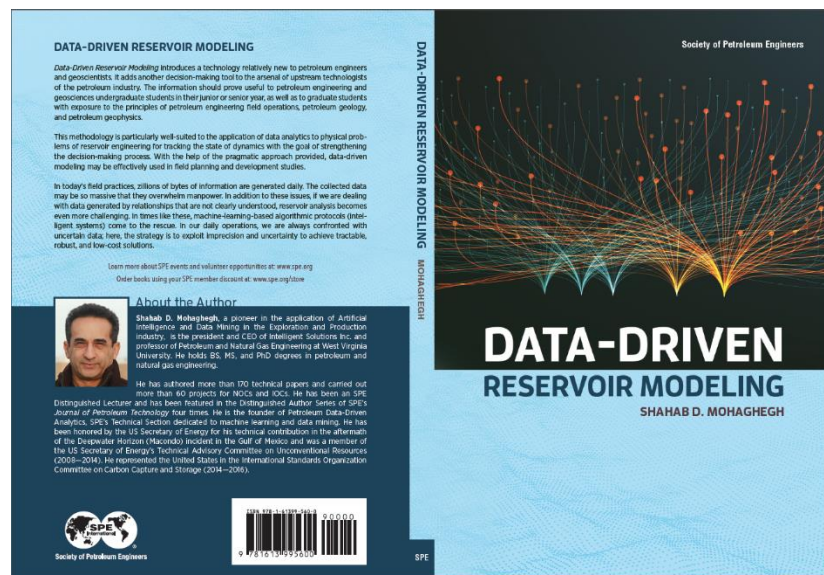


SPE Books:

Data Driven Reservoir Modeling

<http://store.spe.org/Data-Driven-Reservoir-Modeling-P1054.aspx>



SPE Technical Papers:

SPE PetroTalk: Shahab Mohaghegh – AI and Machine Learning

<https://www.youtube.com/watch?v=Simc0Kd4sPY&t=46s>

INDUSTRY'S APPROACH TO AI & ML

- Recently, some companies have identified this problem and are moving toward using DOMAIN EXPERTS as the lead of their "Data Analytics Group"
 - This is a major step in the right direction.
- Nevertheless, when it comes to AI & ML, there has been too much hype, marketing schemes, and non-sense that has overwhelmed the industry.
- A correct approach to the application of AI & ML in our Petroleum Engineering Departments, may be the best answer to this problem.

SPE Young Technology Series (July 2016)

<https://www.spe.org/en/jpt/jpt-article-detail/?art=742>



OnePetro Library:

- Intelligent Production Modeling Using Full Field Pattern Recognition. "***SPE Reservoir Evaluation and Engineering Journal***". Volume 14, No. 6, December 2011, pp. 735-749. DOI: [dx.doi.org/10.2118/132643-PA](https://doi.org/10.2118/132643-PA).
- Artificial intelligence and Data Mining: Enabling Technology for Smart Fields. SPE's ***The Way Ahead Journal***. Volume 5, Number 3, 2009. pp 14-19.
- An Integrated Technique for Production Data Analysis (PDA) with Application to Mature Fields. ***SPE Production & Operations Journal***. November 2007, Volume 22, Number 4. pp 403 - 416.
- Subsurface Analytics Case Study; Reservoir Simulation and Modeling of Highly Complex Offshore Field in Malaysia, Using Artificial Intelligent and Machine Learning. ***SPE 201693***. SPE ATCE (Annual Technical Conference and Exhibition) 2020. Houston, Texas, 17-19 October 2020.
- Frac-Hit Dynamic Modeling using Artificial Intelligence & Machine Learning. Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***URTEC-2020-2647-MS***. SPE/AAPG/SEG Unconventional Resources Technology Conference, 20-22 July, 2020
- Data-Driven vs. Traditional Reservoir Numerical Models: A Case Study Comparison of Applicability, Practicality and Performance. ***SPE 197716***, SPE ADIPEC- 11-14 November 2019.
- Shale Descriptive Analytics, Which Parameters are Controlling Production in Shale. Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***SPE-196226***. SPE Annual Technical Conference and Exhibition Calgary, AB, Canada, 30 September - 2 October 2019
- Contribution of Artificial Intelligence and Machine Learning in the U.S. DOE's Efforts during the aftermath of Deepwater Horizon. Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***SPE-191613***. SPE Annual Technical Conference and Exhibition. Dalla, Texas, USA, 24-26 September 2018
- Mapping the Natural Fracture Network in Marcellus Shale using Artificial Intelligence. Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***SPE-187131***. SPE Annual Technical Conference and Exhibition. San Antoni, Texas, USA, 09-11 October 2017
- Mapping the Natural Fracture Network in Utica Shale Using Artificial Intelligence (AI). Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***URTeC 2669739***. SPE Hydraulic Fracturing Technology Conference and Exhibition. Austin, Texas, USA, 24-26 July 2017
- Developing a Smart Proxy for the SACROC Water-Flooding Numerical Reservoir Simulation Model. Alenezi, F. West Virginia University and Saudi Aramco. Mohaghegh, S. D., Intelligent Solutions, Inc., West Virginia University. ***SPE-185691***. SPE Western Regional Meeting. Bakersfield, CA. 23 April 2017
- Shale Analytics: Making Production and Operational Decisions Based on Facts: A Case Study in Marcellus Shale. ***SPE-184822***. SPE Hydraulic Fracturing Technology Conference and Exhibition. The Woodlands, Texas, USA, 24—26 January 2017

- Reservoir Simulation Using Smart Proxy in SACROC Unit - Case Study. Qin He, Saint Francis University, Shahab D. Mohaghegh, Intelligent Solutions, Inc. & West Virginia University, Zhikun Liu, Xi'an Shiyou University. **SPE-184069** - SPE Eastern Regional Meeting 2016 (URTeC). Canton, Ohio - September 13 - 15, 2016
- Fact-Based Re-Frac Candidate Selection and Design in Shale – A Case Study in Application of Data Analytics. **URTeC: 2433427** - Unconventional Resources Technology Conference (URTeC). San Antonio, Texas, USA, 1-3 August 2016 - DOI 10.15530-urtec-2016-2433427.
- Conditioning the Estimating Ultimate Recovery of Shale Wells to Reservoir and Completion Parameters. **SPE-184064** - SPE Eastern Regional Meeting. Canton, Ohio - September 13 - 15, 2016.
- Smart Proxy: an Innovative Reservoir Management Tool; Case Study of a Giant Mature Oilfield in the UAE. **SPE 177829**, ADIPEC - Abu Dhabi International Petroleum Exhibition and Conference, Abu Dhabi, UAE, 9–12 November 2015
- Understanding the Impact of Rock Properties and Completion Parameters on Estimated Ultimate Recovery in Shale. **SPE 177318**, SPE Eastern Regional Meeting Morgantown, West Virginia, USA, 13–15 October 2015.
- Formation vs. Completion: Determining the Main Drivers behind Production from Shale? A Case Study Using Data-Driven Analytics. **URTeC 2147904**, Unconventional Resources Technology Conference San Antonio, Texas, USA, 20-22 July 2015.
- Production Management Decision Analysis Using AI-Based Proxy Modeling of Reservoir Simulations – A Look-Back Case Study. **SPE 170664**, SPE Annual Technical Conference and Exhibition (ATCE). Amsterdam, the Netherlands, 27-29 October 2014.
- Data-Driven Reservoir Management of a Giant Mature Oilfield in the Middle East. **SPE 170660**, SPE Annual Technical Conference and Exhibition (ATCE). Amsterdam, the Netherlands, 27-29 October 2014.
- Artificial Intelligence (AI) Assisted History Matching. **SPE 169507**, SPE Western North American and Rocky Mountain Joint Regional Meeting. Denver, Colorado, USA, 16-18. April 2014.
- Pattern Recognition and Data-Driven Analytics for Fast and Accurate Replication of Complex Numerical Reservoir Models at the Grid Block Level. **SPE 167897**, SPE Intelligent Energy Conference and Exhibition. Utrecht, the Netherlands, 1–3 April 2014.
- Production Analysis of a Niobrara Field Using Intelligent Top-Down Modeling. **SPE 169573**, SPE Western North American and Rocky Mountain Joint Regional Meeting. Denver, Colorado, USA, 16-18 April 2014.
- Data Driven Analytics in Powder River Basin, WY. **SPE 166111**, SPE Annual Technical Conference and Exhibition. New Orleans, Louisiana, September 30 - October 2, 2013.
- Using Data-Driven Analytics to Assess the Impact of Design Parameters on Production from Shale. **SPE 166240**, SPE Annual Technical Conference and Exhibition. New Orleans, Louisiana, September 30 - October 2, 2013.

- Which Parameters Control Production in Shale Assets? A Pattern Recognition Study. **SPE 165712** - SPE Eastern Regional Conference and Exhibition Pittsburgh, PA , 20-22 August 2013.
- Fast Track Analysis of Shale Numerical Models. **SPE 162699** - SPE Canadian Unconventional Resources Conference. Calgary, Alberta, Canada, 30 October–1 November 2012.
- Forecasting, Sensitivity and Economic Analysis of Hydrocarbon Production from Shale Plays Using Artificial Intelligence & Data Mining. **SPE 162700** - SPE Canadian Unconventional Resources Conference Calgary, Alberta, Canada, 30 October–1 November 2012.
- Modeling and History Matching Hydrocarbon Production from Marcellus Shale using Data Mining and Pattern Recognition Technologies. **SPE 161184** - SPE Eastern Regional Conference Lexington, Kentucky, USA, 3–5 October 2012.
- Application of Well-Based Surrogate Reservoir Models (SRMs) to Two Offshore Fields in Saudi Arabia, Case Study. **SPE 153845** - Western Regional Meeting. Bakersfield, California, USA, 21-23 March 2012.
- Grid-Based Surrogate Reservoir Modeling (SRM) for Fast Track Analysis of Numerical Reservoir Simulation Models at the Grid block Level. **SPE 153844** - Western Regional Meeting. Bakersfield, California, USA, 21-23 March 2012.
- Uncertainty Analysis of a CO2 Sequestration Project Using Surrogate Reservoir Modeling Technique. **SPE 153843** - Western Regional Meeting. Bakersfield, California, USA, 21-23 March 2012.
- Application of Surrogate Reservoir Model (SRM) to an Onshore Green Field in Saudi Arabia; Case Study. **SPE 151994** - North Africa Technical Conference and Exhibition. Cairo, Egypt, 20–22 February 2012.
- Top-Down Modeling: Practical, Fast Track, Reservoir Simulation & Modeling for Shale Formations. AAPG/SPE/SEG/SPWLA Joint Hedberg Research Conference. Austin, Texas, December 2-10, 2010.
- Fast Track Reservoir Modeling of Shale Formations in the Appalachian Basin. Application to Lower Huron Shale in Eastern Kentucky. **SPE 139101**, Proceedings, 2010 SPE Eastern Regional Conference & Exhibition. Morgantown, West Virginia. 12-14 October 2010.
- Field Development Strategies for Bakken Shale Formation. **SPE 139032**, Proceedings, 2010 SPE Eastern Regional Conference & Exhibition. Morgantown, West Virginia. 12-14 October 2010.
- New Insight into Integrated Reservoir Management using Top-Down, Intelligent Reservoir Modeling Technique; Application to a Giant and Complex Oil Field in the Middle East. **SPE 132621** - Proceedings, 2010 SPE Western Regional Conference & Exhibition. Anaheim, California. 27-29 May 2010.
- Top-Down Intelligent Reservoir Modeling of New Albany Shale. **SPE 125859** - Proceedings, 2009 SPE Eastern Regional Conference & Exhibition. Charleston, West Virginia.

- Top-Down Intelligent Reservoir Modeling (TDIRM). **SPE 124204** - Proceedings, 2009 SPE Annual Conference & Exhibition. New Orleans, Louisiana.
- Field-Wide Reservoir Characterization Based on a New Technique of Production Data Analysis. **SPE 111205**, Proceedings, 2007 SPE Eastern Regional Conference & Exhibition. Lexington, Kentucky, 17-19 October 2007.
- Estimating major and Minor Natural Fracture pattern in Gas Shale Using Production Data. **SPE 104554**, Proceedings, 2006 SPE Eastern Regional Conference & Exhibition. Canton, Ohio, 11-13 October 2006.
- Uncertainty Analysis of a Giant Oil Field in the Middle East Using Surrogate Reservoir Model. **SPE 101474** - Proceedings, 2006 Abu Dhabi International Petroleum Exhibition and Conference. Abu Dhabi, U.A.E., 5-8 November 2006.
- Quantifying Uncertainties Associated with Reservoir Simulation Studies Using Surrogate Reservoir Models. **SPE 102492** - Proceedings, 2006 SPE Annual Conference & Exhibition. 24-27 September 2006, San Antonio, Texas.
- Identifying Infill Locations and Underperformer Wells in Mature Fields using Monthly Production Rate Data, Carthage Field, Cotton Valley Formation, Texas. **SPE 104550**, Proceedings, 2006 SPE Eastern Regional Conference & Exhibition. Canton, Ohio, 11-13 October 2006.