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Founder and CEO of Intelligent Solutions, Inc.
Professor of Petroleum & Natural Gas Engineering, West Virginia University

EDUCATION

PENNSYLVANIA STATE UNIVERSITY   [Fall 1991]
Ph.D., Petroleum and Natural Gas Engineering

TEXAS A&I UNIVERSITY   [Fall 1987]
M. S., Natural Gas Engineering

TEXAS A&I UNIVERSITY   [Fall 1985]
B. S., Natural Gas Engineering

SPONSORED RESEARCH Only @ West Virginia University

1991 - 1993   ***Measuring and Predicting Reservoir Heterogeneity in Complex Depo-systems***, Key Investigator, Grant No. DE-AC22-90BC 14657, Department of Energy, Pittsburgh Energy and Technology Center, (Engineering Task).

1992 - 1993   ***Microbial Desulfurization of West Virginia Bituminous***, Principal Investigator, Grant from National Research Center for Coal and Energy, Mining and Mineral Resources Research Institute.

1993 - 1995   ***Artificial Neural Networks, A New Tool for Petroleum Industry***, Principal Investigator, Grant from Coal and Energy Research Bureau, Faculty/Private Business Cooperative Research Program, co-funded by Consolidated Natural Gas Transmission Corporation.

1993 - 1994   ***Treatment of Volatile Organic Compounds (VOCs) Using Bio-filters***, Principal Investigator, Grant from West Virginia University=s Cooperative Agreement with U.S. Department of Energy, Morgantown Energy Technology Center.

1994 - 1996   ***Development of Standard Test Protocols and Barrier Design Models for In Situ Formed Barriers***, Co-PI, Funded by: U. S. Department of Energy, Morgantown Energy Technology Center.

1994 - 1996   ***A Fuzzy Logic-based Expert Consultation System (FLECS) for Coalbed Methane Control and Degasification, Based on WVU MMSS System and Integrating the USBM METHPRO System***, Principal Investigator, Funded by: One natural gas and four coal companies through College of Mineral & Energy Resources. Co-funded by National Research Center for Coal and Energy.

1995 - 1996   ***Virtual Hydraulic Fracture System; Application of Computational Intelligence in Hydraulic Fracture Design and Development***, Principal Investigator, Funded by: National Research Center for Coal and Energy.

1995 - 1996   ***Establishment of a World Wide Web (WWW) Site for the National Environmental Education and Training Center***, Principal Investigator, Funded by: National Environmental Education and Training Center.

1997 - 1998   ***College of Engineering and Mineral Resources Virtual Classroom on the Internet***, Principal Investigator, Funded by: State College and University Systems of West Virginia and CEMR.

1997 - 2001   ***Consortium for Virtual Operations Research (CVOR),*** Principal Investigator, Director of the Consortium at WVU, Funded by: East Ohio Gas Company, Saudi Aramco, and Halliburton Energy Services.

2000 - 2001   ***Developing a Virtual Classroom on the Internet for Freshman Engineering 1 and 2*** , Principal Investigator, Funded by: Division of Extended Learning of West Virginia University and CEMR.

2000 - 2003   ***Teams of Interdisciplinary Graduate fellows Engaged to Reinvigorate Students to Science, Mathematics, Engineering and Technology***, Faculty Mentor, Funded by: National Science Foundation.

2000 - 2001   ***An Intelligent Systems Approach for High Resolution, Inter-well Oil Reservoir Characterization***, CO-Principal Investigator, In cooperation with Advance Resources International, Funded by US Department of Energy.

2000 - 2002   ***Development of Data Driven Computer Applications for Optimization of Upstream Petroleum Operations***, CO-Principal Investigator, Funded by Gas Technology Institute.

2001 - 2003   ***Identification and Demonstration of Preferred Upstream Management Practices (PUMP) for the Oil Industry***, CO-Principal Investigator, Funded by US Department of Energy.

2002 - 2002   ***A Comprehensive Study to Enhance Gas Production in the Appalachian Basin***, CO-Principal Investigator, Funded by WVU research Corporation, Research Incentive Competative Grant Program.

2003 - 2005   ***An Intelligent Systems Approach to Reservoir Characterization***, Principal Investigator, Funded by U.S. Department of Energy.

2004 - 2005   ***Northern Appalachian Basin Coal Bed Methane Assessment Project***, CO-Principal Investigator, Funded by Research Partnership to Secure Energy for America.

2004 - 2005   ***Horizontal Well Configurations for CBM Production***, Principal Investigator, Funded by CDX Gas LLC.

2004 - 2006   ***Gas Storage Field Deliverability Enhancement and Maintenance: An Intelligent Portfolio Management Approach***, Principal Investigator, Funded by U.S.

Department of Energy through Gas Storage Technology Consortium managed by Penn State University.

2003 - 2007   ***Data-Knowledge Fusion; an Integrated Intelligent Systems Approach to Analysis, Modeling, & Simulation of Large & Complex Databases, Augmented by Human Expert Knowledge; Application to Forensic Crime Scene Glass Identification Database***, Principal Investigator, Funded by National Institute of Justice.

2008 - 2010   ***Best Practices Analysis in New Albany Shale***, Co-Principal Investigator, Funded by Research Partnership to Secure Energy for America (RPSEA).

2008 - 2012   ***Estimating Natural Fracture Network Patterns in Gas Shales & Tight Sands***, Principal Investigator, Funded by U.S. Department of Energy.

2011 - 2012   ***Marcellus Gas Shale Project***, Co-Principal Investigator, Funded by Research Partnership to Secure Energy for America (RPSEA).

2010 - 2013   ***Second Generation of Reduced Order Models for Reservoir Behavior (National Risk Assessment Partnership) - The Otway CO2 Sequestration Project***, Principal Investigator, Funded by United States Department of Energy, National Energy Technology Laboratory.

2012 - 2013   ***Reservoir Scale Impacts of Relative Permeability and Residual Saturation on Injectivity and Capillary Trapping***, Principal Investigator at WVU, Funded by United States Department of Energy, National Energy Technology Laboratory.

2012 - 2013   ***Effects of CO2 Storage on Porosity/Permeability of Shales,*** Principal Investigator at WVU, Funded by United States Department of Energy, National Energy Technology Laboratory.

2004 - 2014   ***Sequestration of Carbon Dioxide in Appalachian Coal Deposits***, Co-Principal Investigator, Funded by U.S. Department of Energy through Montana State University.

2009 - 2014   ***In-Situ MVA of CO2 Sequestration Using Smart Field Technology***, Principal Investigator, Funded by United States Department of Energy.

2013 - 2014   ***Third Generation of Reduced Order Models for Reservoir Behavior (National Risk Assessment Partnership) - The SACROC CO2-EOR Project***, Principal Investigator, Funded by United States Department of Energy, National Energy Technology Laboratory.

2011 - 2014   ***CO2 Sequestration in Depleted Shale Formation***, , Principal Investigator at WVU, Funded by United States Department of Energy, National Energy Technology Laboratory.

2016 - 2018   ***Smart Proxy Development for Computation Fluid Dynamics (CFD) Models***, Principal Investigator, Funded by ORISE (Oak Ridge Institute for Science and Technology) through DOE-NETL, United States Department of Energy, National Energy Technology Laboratory.

PUBLICATIONS

A. Refereed/Peer Reviewed Journal Articles

Determining the main drivers in hydrocarbon production from shale using advanced data-driven analytics – A case study in Marcellus shale. *Journal of Unconventional Oil and Gas Resources*. 15 (2016) 146-157. http://dx.doi.org/10.1016/j.juogr.2016.07.004

Data-driven Proxy at Hydraulic Fracture Cluster Level: A Technique for Efficient CO2-Enhanced Gas Recovery and Storage Assessment in Shale Reservoir. *Journal of Natural Gas Science and Engineering.* doi: 10.1016/j.jngse.2015.06.039

Full Field Reservoir Modeling of Shale Assets using Advanced Data-Driven Analytics. *Geoscience Frontiers*. 2015 - http://dx.doi.org/10.1016/j.gsf.2014.12.006. http://www.sciencedirect.com/science/article/pii/S1674987114001649#

Coupling Numerical Simulation and Machine Learning to Model Shale Gas Production at Different Time Resolutions*. Journal of Natural Gas Science and Engineering*. Vol. 25 (2015) - pp 380-392

Evaluation of Rapid Performance Reservoir Models for Quantitative Risk Assessment. *Energy Procedia.* Vol. 63 (2014) - pp 3425-3431

Geomechanical Properties of Unconventional Shale Reservoirs," *Journal of Petroleum Engineering,* Vol. 2014, Article ID 961641, 10 pages, 2014. doi:10.1155/2014/961641.

Modeling Pressure and Saturation Distribution in a CO2 Storage Project using a Surrogate Reservoir Model (SRM). *Greenhouse Gas Science and Technology* - Society of Chemical Industry & John Wiley & Sons, LTD. Vol. 4, 2014. pp.1-27; DOI: 10.1002/ghg

Converting Detail Reservoir Simulation Models into Effective Reservoir Management Tools using SRMs; Case Study – Three Green Fields in Saudi Arabia. *International Journal of Oil, Gas and Coal Technology*. Vol. 7, No. 2, 2014. pp.115–131.

State of the Art of Artificial Intelligence and Predictive Analytics in the E&P Industry: A Technology Survey. *SPE Journal*. Volume 18, Number 4, August 2013. http://dx.doi.org/10.2118/150314-PA

Reservoir Modeling of Shale Formations. *Journal of Natural Gas Science and Engineering*. Vol. 12, (2013), pages 22-33.

A Field Study on Simulation of CO_2 Injection and ECBM Production and Prediction of CO_2 Storage Capacity in Unmineable Coal Seam. *Journal of Petroleum Engineering*. Vol. 2013, Article ID 803706, 8 Pages - DOI: http://dx.doi.org/10.1155/2013/803706

Top-Down, Intelligent Reservoir Modeling of Oil and Gas Producing Shale Reservoirs: Case Studies. *International Journal of Oil, Gas and Coal Technology*. Vol. 5, No.1, 2012 pp. 3 - 28 - DOI: 10.1504/IJOGCT.2012.044175.

Intelligent Production Modeling Using Full Field Pattern Recognition. *SPE Reservoir Evaluation and Engineering Journal.* Volume 14, No. 6, December 2011, pp. 735-749 http://dx.doi.org/10.2118/132643-PA.

Fuzzy Upscaling in Reservoir Simulation: An Improved Alternative to Conventional Techniques*. Journal of Natural Gas Science and Engineering*. Volume 3 (2011), pp. 706-715.

Reservoir Simulation And Modeling Based On Artificial Intelligence And Data Mining (AI&DM). *Journal of Natural Gas Science and Engineering*. Volume 3 (2011), pp. 697-705.

A New Practical Approach in Modeling and Simulation of Shale Gas Reservoirs: Application to New Albany Shale. *International Journal of Oil, Gas and Coal Technology,* Volume 4, Number 2, 2011. pp 104-133.

Intelligent Seismic Inversion Workflow for High-Resolution Reservoir Characterization. *Computers & Geosciences, An International Journal,* Volume 37, Issue 2, 2011. pp 143-157.

Coalbed Methane Reservoir Simulation and Uncertainty Analysis with Artificial Neural Network. *Scientia Iranica, Transactions C: Chemistry and Chemical Engineering, Volume 17, No. 1, pp. 65-76. June* 2010.

Using Artificial Neural Networks to Generate Synthetic Well Logs. *Journal of Natural Gas Science and Engineering,* October 2009, doi:10.1016/j.jngse.2009.08.003 .

Artificial intelligence and Data Mining: Enabling Technology for Smart Fields. *SPE's The Way Ahead Journal,* Volume 5, Number 3, 2009. pp 14-19.

Development of Surrogate Reservoir Model (SRM) for Fast Track Analysis of a Complex Reservoir. *International Journal of Oil, Gas and Coal Technology,* February 2009, Volume 2, Number 1. pp 2-23.

An Intelligent System's Approach for Revitalization of Brown Fields Using Only Production Rate Data. *International Journal of Engineering,* Vol. 22 No. 1, February 2009, pp 89-116.

A Parametric Study on the Benefits of Drilling Horizontal and Multilateral Wells in Coalbed Methane Reservoirs. *SPE Reservoir Evaluation & Engineering*, Vol. 11. No. 6, December 2008.

An Intelligent System's Approach for Revitalization of Brown Fields Using Only Production Rate Data. *International Journal of Engineering*, Vol. 21. No. 2, November 2008.

Essential Components of an Integrated Data Mining Tool for the Oil and Gas Industry with an Example Application in the DJ Basin. *Scientia Iranica*, Vol. 15. No. 4, August 2008, pp 469-479.

Building the Foundation for Prudhoe Bay Oil Production Optimization Using Neural Networks. *International Journal of Oil, Gas and Coal Technologies*, Vol. 1. NOs. 1 & 2, January 2008, pp 65-80.

An Integrated Technique for Production Data Analysis (PDA) with Application to Mature Fields. *SPE Production & Operations Journal*, Vol. 22. NO.4, November 2007, pp 403-416.

A New Methodology for the Identification of Best Practices in the Oil and Gas Industry, Using Intelligent Systems. *Journal of Petroleum Science and Engineering*, Vol. 49, Issues 3-4, December 2005, pp 239-260.

Recent Developments in Application of Artificial Intelligence in Petroleum Engineering. *Journal of Petroleum Technology*, Distinguished Author Series, April 2005, pp 86-91.

Performance Drivers in Restimulation of Gas Storage Wells. *SPE Reservoir Evaluation & Engineering Journal*, December 2001, pp 536-543.

Intelligent Systems Application in Candidate Selection and Treatment of Gas Storage Wells. *Journal of Petroleum Science and Engineering*, November 2001, Vol. 31, Issue 2-4, pp 125-133, Elsevier Science Publications, Amsterdam, Holland.

Use of Intelligent Systems in Reservoir Characterization via Synthetic Magnetic Resonance Logs. *Journal of Petroleum Science and Engineering*, May 2001, Vol. 29, Issue 3-4, pp 189-204, Elsevier Science Publications, Amsterdam, Holland.

Virtual Intelligence Applications in Petroleum Engineering: Part 3 – Fuzzy Logic. *Journal of Petroleum Technology*, Distinguished Author Series, November 2000, pp 82-87.

Virtual Intelligence Applications in Petroleum Engineering: Part 2 – Evolutionary Computing. *Journal of Petroleum Technology*, Distinguished Author Series, October 2000, pp 40-46.

Virtual Intelligence Applications in Petroleum Engineering: Part 1 – Artificial Neural Networks. *Journal of Petroleum Technology*, Distinguished Author Series, September 2000, pp 64-73.

Design Optimum Frac Jobs Using Virtual Intelligence Techniques. *Computers and Geosciences Journal*, October 2000, Vol. 26, Issue 8, pp 927-939, Elsevier Science Publications, Amsterdam, The Netherlands.

Hydraulic Fracture Design and Optimization of Gas Storage Wells. *Journal of Petroleum Science and Engineering*, October 1999, Vol. 23, Issue 3-4, pp 161-171, Elsevier Science Publications, Amsterdam, Holland.

Determination of Permeability From Well Log Data. *SPE Formation Evaluation Journal*, September 1997, pp 170-174.

Petroleum Reservoir Characterization with the Aid of Artificial neural networks. *Journal of Petroleum Science and Engineering*, December 1996, Vol. 16, pp 263-274, Elsevier Science Publications, Amsterdam, Holland.

Predicting Well Stimulation Results in a Gas Storage Field in the Absence of Reservoir Data, Using Neural Networks. *SPE Reservoir Engineering Journal*, November 1996, pp 54-57.

Performance of a Virtual Runoff Hydrograph System (VROHS). *Journal of Water Resources Planning and Management*, American Society of Civil Engineers, ASCE, November 1996.

Performance of a Virtual Adsorber System for Removal of Lead. *Journal of Separation Science and Technology*, *Marcel Dekker, Inc., New York, NY*, Vol. 31, issue 7, April 1996, pp 965-985.

Virtual Measurement of Heterogeneous Formation Permeability Using Geophysical Well Log Responses. *The Log Analyst*, A Journal of Formation Evaluation and Reservoir Description, Society of Professional Well Log Analysts, March-April, 1996, pp 32-39.

Identification of Parameters Influencing the Response of Gas Storage Wells to Hydraulic Fracturing With the Aid of a Neural Network. *SPE Computer Applications Journal*, April 1996, pp 54-57.

Design and Development of an Artificial Neural Network for Estimation of Formation Permeability; *SPE Computer Applications Journal*, December 1995, pp 151-154.

Production Decline Curves for Low-Pressure Gas Reservoirs Undergoing Simultaneous Water Production; *SPE Formation Evaluation Journal*, March, 1995, pp 57-62.

Neural Network: What It Can Do For Petroleum Engineers; *Journal of Petroleum Technology*, January, 1995, page 42.

Predicting the Production Performance of Gas Reservoirs Using Production Type Curves, *Scientia Iranica,* 1993.

B. *Books and Book Chapters*

BOOKS

Title: Data Driven Reservoir Modeling (ISBN: 978-1-61399-560-0) 2017

Author: Shahab D. Mohaghegh

Publisher: Society of Petroleum Engineers (SPE) - http://store.spe.org/Data-Driven-Reservoir-Modeling-P1054.aspx

Title: Shale Analytics (ISBN: 978-3-319-48751-9) 2017

Author: Shahab D. Mohaghegh

Publisher: Springer - http://www.springer.com/us/book/9783319487519

Title: Artificial Intelligence & Data Mining Applications in the E&P Industry (Digital Edition). (ISBN: 978-1-61399-064-3) 2011

Author: Shahab D. Mohaghegh

Co-Authors: Saud Al-Fattah and Andrei Popa

Publisher: Society of Petroleum Engineers (SPE) - http://store.spe.org/Artificial-Intelligence-Data-Mining-Applications-in-the-EP-Industry-Digital-Edition-P513.aspx

CHAPTERS

Chapter Title: Oilfield Data Mining.

Author: Shahab D. Mohaghegh & Emre Artun

Book Title: Exploration and Production of Petroleum & Natural Gas (pp 149-176).

Edited by: M.R. Riazi

Publisher: ASTM International MNL-73

ISBN: 978-0-8031-7068-1 (hardcover)

Web Site: https://compass.astm.org/DIGITAL_LIBRARY/MNL/SOURCE_PAGES/MNL73.htm

Chapter Title: Application of Artificial Intelligence in the Upstream Oil and Gas Industry.

Author: Shahab D. Mohaghegh & Yasaman Khazaeni

Book Title: Artificial Intelligence: Approaches, Tools and Applications. pp 1 – 38.

Edited by: Brent M. Gordo

Publisher: Nova Science Publishers, Inc., New York - 2011

ISBN: 978-1-61324-019-9 (hardcover)

Web Site: https://www.novapublishers.com/catalog/product_info.php?cPath=23_29&products_id=20177

Chapter Title: Natural Gas Storage Engineering.

Author: Kashy Aminian and Shahab D. Mohaghegh

Book Title: Petroleum Engineering-Downstream, Encyclopedia of Life Support Systems (EOLSS), Developed under the Auspices of the UNESCO

Edited by: Pedro de Alcantara Pessoa Filho

Publisher: December 2008, Eolss Publisher, Oxford, UK.

Web Site: http://www.eolss.net

Chapter Title: Virtual Magnetic Resonance Logs, a Low Cost Reservoir Description Tool.

Author: Shahab D. Mohaghegh

Book Title: Soft Computing and Intelligent Data Analysis in Oil Exploration, Elsevier Science B.V., pp 605 - 632

Edited by: M. Nikravesh, F. Aminzadeh, L. Zadeh

Publisher: December 2002, Elsevier Science B.V., the Netherlands

ISBN: 0-444-50685-3

Chapter Title: Enhancing Gas Storage Wells Deliverability Using Intelligent Systems,

Author: Shahab D. Mohaghegh

Book Title: Soft Computing and Intelligent Data Analysis in Oil Exploration, Elsevier Science B.V., pp 445 - 467

Edited by: M. Nikravesh, F. Aminzadeh, L. Zadeh

Publisher: December 2002, Elsevier Science B.V., the Netherlands

ISBN: 0-444-50685-3

Chapter Title: Taking One Step Forward in Reservoir Characterization Using Neural Networks,

Author: Shahab D. Mohaghegh

Book Title: Soft Computing For Reservoir Characterization and Modeling, Studies in Fuzziness and Soft Computing, Physica-Verlag, pp 129-160

Edited by: P. M. Wong, F. Aminzadeh, M. Nikravesh

Publisher: October 2001 Springer-Verlag Heidelberg, Heidelberg, Germany

ISBN: 3-7908-1421-0

Chapter Title: Increasing Natural Gas Production using a Hybrid Intelligent System,

Authors: Shahab D. Mohaghegh, Steve Wolhart, and David Hill

Book Title: Advances in Scientific Computing, Computational Intelligence, and

Applications – Mathematics and Computers in Science and Engineering, *A Series of Reference Books and Textbooks*, pp 459-67

Edited by: N. Mastorakis, V. Mladenov,

Publisher: 2001 *WSES Press*

ISBN: 960-8052-36-x

Chapter Title: Microbial Desulfurization of Illinois Coals and Texas Lignite by Organisms of the Genus Pseudomonas.

Authors: Charanji Rai, Shahab D. Mohaghegh

Book Title: Processing and Utilization of High-Sulfur Coals III, pp 459-67

Edited by: R. Markuszewski and T.D. Wheelock,

Publisher: 1990 *Elsevier Science Publisher* B.V., Amsterdam

C. Refereed/Peer Reviewed Conference Proceedings

A Soft Computing-Based Method for the Identification of Best Practices, with Application in Petroleum Industry. *2005 IEEE International Conference on Computational Intelligence for Measurement Systems& Applications.* July 20-22, 2005, Taormina, Sicily, Italy.

Determining In-Situ Stress Profiles of Hydrocarbon Reservoirs from Geophysical Well Logs Using Intelligent Systems. *2004 International Joint Conference on Neural Networks, IJCNN and FUZZIEEE 2004.* July 25-29, 2004, Budapest, Hungary.

Recent Neural Network Applications In Petroleum Engineering, *5th Turkish Symposium on Artificial Intelligence and Neural Networks*, June 27-28, 1996, Istanbul, Turkey.

Using Artificial Neural Networks To Increase Petroleum Production Efficiency; *World Congress On Neural Networks*, Sponsored by International Neural Network Society, European Neural Network Society, and Japanese Neural Network Society, Washington D.C., U.S.A., July 17-21, 1995.

Modeling the Effect of Major Heterogeneities in Hydrocarbon Reservoirs, ICCME 1445, *International Congress on Computational Methods in Engineering,* May 1993, Shiraz, Iran.

A New Approach for Modeling and Simulation of Hydrocarbon Reservoirs Containing Isolated Channels and Barriers, Paper No. 203-052, *The International Association of Science and Technology for Development (IASTED), International Conference on Applied Modeling and Simulation*, July 21-23, 1993. Vancouver, Canada.

D. Invited Papers

AI-Based Simulation: An Alternative to Numerical Simulation and Modeling. ***Operational Research and Data Mining Conference***. Cancun, Mexico, January 2012.

Advances in Reservoir Simulation & Modeling with Artificial Intelligence & Data Mining, ***The Oil & Gas and Energy Journal - Drilling& Exploration World***, November 2009.

Fuzzy Patterns Offer Opportunity. (Tech Watch), ***E & P Journal***, A Hart Publication, Houston, Texas, March 2006. pp 103-105.

No Pressure Data? No Problem. (Reservoir Characterization), ***E & P Journal***, A Hart Publication, Houston, Texas, February 2006. pp 77-78.

E&P 'Gets Smart' with Virtual Intelligence; ***American Oil & Gas Reporter Journal***, Derby, Kansas, July 2001. pp 77-83.

A systematic Way to Identify Restimulation Candidates in Tight Gas Fields; ***Gas Tips Journal***, Published by Gas Research Institute, Chicago, Illinois, Summer 1999, Vol. 5, No.2, pp 21-30.

Virtual Hydraulic Fracture (VHF) System, Using Computational Intelligence to Predict Storage Well Deliverability After Hydraulic Fracture; ***American Gas Association Operational Conference***, Las Vegas, Nevada, May 7-10, 1995.

Effects of Pore Surface Mineralogy on Behavior of Petroleum Bearing Reservoir Rocks, *First **International Non-Renewable Energy Sources Congress***, 1993, Tehran Iran.

E. *Proceeding/Technical Articles*

2017

Mapping the Natural Fracture Network in Marcellus Shale using Artificial Intelligence. Mohaghegh, S. D., SPE-187131. SPE Annual Technical Conference and Exhibition (ATCE) San Antonio, Texas, USA, 09-11 October, 2017.

Mapping the Natural Fracture Network in Utica Shale using Artificial Intelligence (AI). Shahab D. Mohaghegh. URTeC: 2669739. Unconventional Resources Technology Conference, Austin, Texas, USA, 24-26 July, 2017. (URTeC) DOI 10.15530-urtec-2017-2669739.

Shale Analytics: Making Production and Operational Decisions Based on Facts: A Case Study in Marcellus Shale. Mohaghegh, S. D., Gaskari, R., Maysami, M. SPE-184822. SPE Hydraulic Fracturing Technology Conference and Exhibition. The Woodlands, Texas, USA, 24—26 January 2017.

2016

Fact-Based Re-Frac Candidate Selection and Design in Shale – A Case Study in Application of Data Analytics. Shahab D. Mohaghegh. URTeC: 2433427. Unconventional Resources Technology Conference, San Antonio, Texas, USA, 1-3 August 2016. (URTeC) DOI 10.15530-urtec-2016-2433427.

Conditioning the Estimated Ultimate Recovery of Shale Wells to Reservoir and Completion Parameters. Alabboodi, M.J., Mohaghegh, S.D., Vass, R.L., SPE-184064. SPE Eastern Regional Meeting 2016.

Reservoir Simulation Using Smart Proxy in SACROC Unit - Case Study. Qin H., Mohaghegh, S.D., Liu, Z., SPE-184069. SPE Eastern Regional Meeting 2016.

A Data-Driven Smart Proxy Model for A Comprehensive Reservoir Simulation, Faisal Alenezi, and Mohaghegh, S. D., West Virginia University, 2016 4th Saudi International Conference on Information Technology (Big Data Analysis) (KACSTIT), Riyadh, Saudi Arabia - doi: 10.1109/KACSTIT.2016.7756063

2015

Smart Proxy: an Innovative Reservoir Management Tool; Case Study of a Giant Mature Oilfield in the UAE. Mohaghegh, S. D., Intelligent Solutions, Inc. & West Virginia University, Abdulla, F., and Abdou, M. ADCO, Gaskari, R., and Maysami, M., Intelligent Solutions, Inc. 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. Faegheh Javadi, Eclipse Resources Inc. and Shahab D. Mohaghegh, West Virginia University. SPE 177318, SPE Eastern Regional Meeting. Morgantown, West Virginia, USA, 13–15 October 2015.

Interpretation of Real-Time Pressure Measurements to Detect CO2 Leakage. S. Alireza Haghighat, Eclipse Resources; Shahab D. Mohaghegh, West Virginia University. SPE 175020, SPE Annual Technical Conference and Exhibition. Houston, Texas, USA, 28–30 September 2015.

Formation vs. Completion: Determining the Main Drivers behind Production from Shale? A Case Study Using Data-Driven Analytics. Mohaghegh, S.D., West Virginia University & Intelligent Solutions, Inc. URTeC 2147904, Unconventional Resources Technology Conference. San Antonio, Texas, USA, 20-22 July 2015.

Shale Asset Production Evaluation by Using Pattern Recognition. Esmaili, S., California Resource Corporation, Mohaghegh, S.D., West Virginia University, and Kalantari-Dahaghi, California Resource Corporation. SPE 174061, SPE Western Regional Conference and Exhibition. Garden Grove, CA, 27-30 April, 2015.

Assisted History Matching Using Pattern Recognition Technology. Shahkarami, A., Saint Francis University, Mohaghegh, S.D., West Virginia University, and Hajizadeh, Y., University of Calgary. SPE 173405, SPE Digital Energy Conference and Exhibition. The Woodlands, Texas, 3-5 March 2015

Application of Artificial Intelligence and Data Mining Techniques for Fast Track Modeling of Geologic Sequestration of Carbon Dioxide – Case Study of SACROC Unit. Shahkarami, A., Saint Francis University, Mohaghegh, S.D., Gholami, V., West Virginia University, and Bromhal, G., National Energy Technology Laboratory. SPE 173406, SPE Digital Energy Conference and Exhibition. The Woodlands, Texas, 3-5 March 2015.

2014

Production Management Decision Analysis Using AI-Based Proxy Modeling of Reservoir Simulations – A Look-Back Case Study. Mohaghegh, Shahab. D., West Virginia University & Intelligent Solutions, Inc. and Abdulla, Fareed, ADCO. 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. Mohaghegh, S.D., West Virginia University & Intelligent Solutions, Inc., Al-Mehairi, Y., ADCO, Gaskari, R. and Maysami, M., Intelligent Solutions, Inc., Khazaeni, Y. Boston University, Gashut, M., Al-Hammadi, A.E., and Kumar, S., ADCO. SPE 170660, SPE Annual Technical Conference and Exhibition (ATCE). Amsterdam, The Netherlands, 27-29 October 2014.

Production Analysis of a Niobrara Field Using Intelligent Top-Down Modeling. Haghighat, A., Mohaghegh, S.D., Gholami, V. and Moreno, D.; SPE 169573, SPE Western North American and Rocky Mountain Joint Regional Meeting held in Denver, Colorado, USA, 16-18 April 2014.

Artificial Intelligence (AI) Assisted History Matching. Shahkarami, A., Mohaghegh, S.D., Gholami, V., and Haghighat, A.; SPE 169507, SPE Western North American and Rocky Mountain Joint Regional Meeting held in 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. Amini, S., Mohaghegh, S.D., Gaskari, R., Bromhal, G. SPE 167897, SPE Intelligent Energy Conference and Exhibition. Utrecht, the Netherlands, 1–3 April 2014.

2013

Top-Down Modeling (TDM) of a Mature Giant Oilfield in the Middle East; Simultaneous History Matching of Production, Static Pressure and Time-Lapse Saturation. Manuscript #878, ADIPEC 2013 Technical Conference. Abu Dhabi, UAE, 10-13 November 2013

Pressure History Matching for CO2 Storage in Saline Aquifers: Case Study for Citronelle Dome. Haghighat, S. A., Mohaghegh, S. D., Gholami, V., Shahkarami, A. Manuscript #P306522, 2013 Carbon Management Technology Conference. Alexandria, Virginia, 21-23 October, 2013.

CO2 Sequestration Modeling Using Pattern Recognition and Data Mining; Case Study of Sacroc Field. Shahkarami, A., Mohaghegh, S. D., Gholami, V., Haghighat, S. A., Moreno, D. Manuscript #P306090, 2013 Carbon Management Technology Conference. Alexandria, Virginia, 21-23 October, 2013.

Impact of Sorption Isotherms on the Simulation of CO2-Enhanced Gas Recovery and Storage Process in Marcellus Shale. Kalantari-dahaghi, A, Mohaghegh, S. D. Manuscript #P317847, 2013 Carbon Management Technology Conference. Alexandria, Virginia, 21-23 October, 2013.

CO2-Driven Enhanced Gas Recovery and Storage in Depleted Shale Reservoir- A Numerical Simulation Study. Kalantari-dahaghi, A, Mohaghegh, S. D. Manuscript #P317871, 2013 Carbon Management Technology Conference. Alexandria, Virginia, 21-23 October, 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

Using Big Data and Smart Field Technology for Detecting Leakage in a CO2 Storage Projects. SPE 166137, SPE Annual Technical Conference and Exhibition. New Orleans, Louisiana, September 30 - October 2, 2013

Data Driven Analytics in Powder River Basin, WY. SPE 166111, SPE Annual Technical Conference and Exhibition. New Orleans, Louisiana, September 30 - October 2, 2013

Reservoir Simulation of CO2 Sequestration in Deep Saline Reservoir, Citronelle Dome, USA. Twelfth Annual Conference on Carbon Capture, Utilization and Sequestration. Pittsburgh, PA, MAY 13-16, 2013

A Critical View of Current State of Reservoir Modeling of Shale Assets. SPE 165713 - SPE Eastern Regional Conference and Exhibition. Pittsburgh, PA, 20-22 August 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.

Synthetic, Geomechanical Logs for Marcellus Shale. SPE 163690 - SPE Digital Energy Conference and Exhibition. The Woodlands, Texas. 5-7 March 2013.

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.

Fast Track Analysis of Shale Numerical Models. SPE 162699 - SPE Canadian Unconventional Resources Conference. Calgary, Alberta, Canada, 30 October–1 November 2012.

Modeling analysis of CO2 Sequestration in Saline Formation Using Artificial Intelligence Technology. Vida Gholami, Shahab D. Mohaghegh, 2012 International Pittsburgh Coal Conference, Pittsburgh, PA, USA - October 15 - 18, 2012.

A Field Study on Simulation of CO2 injection-ECBM Production and Prediction of CO2 Storage Capacity in Un-mineable Coal Seam. Qin He, Shahab D. Mohaghegh, Vida Gholami, 2012 International Pittsburgh Coal Conference, Pittsburgh, PA, USA - October 15 - 18, 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.

Uncertainty Analysis of Otway CO2 Sequestration Project. Shohreh Amini, Shahab D. Mohaghegh, Razi Gaskari, Grant Bromhal, 11th Annual Carbon Capture, Utilization and Sequestration Conference, Pittsburgh, Pennsylvania, April 30 - May 3, 2012.

Application of Well-Based Surrogate Reservoir Models (SRMs) to Two Offshore Fields in Saudi Arabia, Case Study. Shahab D. Mohaghegh, Jim Liu, Razi Gaskari, Mohammad Maysami, and Olugbenga Olukoko, 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. Shahab D. Mohaghegh, Shohreh Amini, Vida Gholami, Razi Gaskari, and Grant Bromhal, SPE 153844 - Western Regional Meeting, Bakersfield, California, USA, 21-23 March 2012.

Uncertainty Analysis of a CO2 Sequestration Project Using Surrogate Reservoir Modeling Technique. Shohreh Amini, Shahab Mohaghegh, Razi Gaskari, Grant Bromhal, SPE 153843 - Western Regional Meeting, Bakersfield, California, USA, 21-23 Mar 2012.

Application of Surrogate Reservoir Model (SRM) to an Onshore Green Field in Saudi Arabia; Case Study. Shahab D. Mohaghegh, Jim Liu, Razi Gaskari, Mohammad Maysami, and Olugbenga A. Olukoko, SPE 151994 - North Africa Technical Conference and Exhibition Cairo, Egypt, 20–22 February 2012.

State of the Art of Artificial Intelligence and Predictive Analytics in the E&P Industry: A Technology Survey. César Bravo, Luigi Saputelli, Francklin Rivas, Anna Gabriela Pérez, Michael Nikolaou, Georg Zangl, Neil de Guzman, Shahab Mohaghegh, and Gustavo Nunez, SPE 150314 - Western Regional Meeting, Bakersfield, California, USA, 21-23 March 2012.

2011

A Parametric Study and Economic Evaluation of Drilling Patterns in Deep, Thick CBM Reservoirs. Ali Omran Nasar, Shahab D. Mohagegh, and Vida Gholami, SPE 149441, SPE Eastern Regional Conference, Columbus, Ohio, August 17-19, 2011.

CO2 Sequestration in Unmineable Coal with Enhanced Coal Bed Methane Recovery: The Marshall County Project. James E. Locke, Richard A. Winschel, Richard A. Bajura, Thomas H. Wilson, Hema J. Siriwardane, Henry Rauch, and Shahab D. Mohagegh, 2011 International Pittsburgh Coal Conference, Pittsburgh, PA, September 12 – 15, 2011.

Reservoir Simulation and Modeling Based on Pattern Recognition. Shahab D. Mohaghegh, West Virginia University & Intelligent Solutions, Inc. SPE 143179, SPE Digital Energy Conference. The Woodlands, Texas, April 19-21, 2011.

Modeling, History Matching, Forecasting and Analysis of Shale Reservoirs Performance Using Artificial Intelligence. Shahab D. Mohaghegh, West Virginia University & Intelligent Solutions, Inc. Ognjen Grujic, Seed Zargari, and Amirmasoud Kalantari, West Virginia University. SPE 143875, SPE Digital Energy Conference. The Woodlands, Texas, April 19-21, 2011.

Numerical Simulation and Multiple Realizations for Sensitivity Study of Shale Gas Reservoirs. Amirmasoud Kalantari & Shahab D. Mohaghegh, West Virginia University. SPE 141058, SPE Production and Operations Symposium. Oklahoma City, Oklahoma, March 27-29, 2011.

2010

Intelligent Time Successive Production Modeling. Yasaman Khazaeni and Shahab D. Mohaghegh, West Virginia University. SPE 132643, Proceedings, 2010 SPE Western Regional Conference & Exhibition. Anaheim, California. 27-29 May 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. Amirmasoud Kalantari-Dahaghi, Shahab D. Mohaghegh and Yasaman Khazaeni, West Virginia University. SPE 132621, Proceedings, 2010 SPE Western Regional Conference & Exhibition. Anaheim, California. 27-29 May 2010.

Modeling and Simulation of ECBM and CO2 Sequestration in Marshall County, West Virginia. Camilo Caldero and Shahab D. Mohaghegh. Petroleum & Natural Gas Engineering. Ninth Annual Conference on Carbon Capture and Sequestration - May 10–13, 2010.

Surrogate Reservoir Model. Shahab D. Mohaghegh, West Virginia University. European Geological Union General Assembly.(Vol. 12, EGU2010-234, 2010). Vienna, Austria. May 2010.

Top-Down, Intelligent Reservoir Model. Shahab D. Mohaghegh, West Virginia University. European Geological Union General Assembly (Vol. 12, EGU2010-233, 2010). Vienna, Austria. May 2010.

2009

Jalali, J.. , Mohaghegh, S. D.; "Reservoir Simulation and Uncertainty Analysis of Enhanced CBM Production Using Artificial Neural Networks", *SPE 125959, Proceedings*, 2009 SPE Eastern Regional Conference & Exhibition. 23-25 September 2009, Charleston, West Virginia.

Kalantari-Dahaghi, A. , Mohaghegh, S. D.; "Economic Impact of Reservoir Properties, Horizontal Well Length and Orientation on Production from Shale Formations: Application to New Albany Shale", *SPE 125893, Proceedings*, 2009 SPE Eastern Regional Conference & Exhibition. 23-25 September 2009, Charleston, West Virginia.

Kalantari-Dahaghi, A. , Mohaghegh, S. D.; "Top-Down Intelligent Reservoir Modeling of New Albany Shale", *SPE 125859, Proceedings*, 2009 SPE Eastern Regional Conference & Exhibition. 23-25 September 2009, Charleston, West Virginia.

Gholami, V. , Mohaghegh, S. D.; "Intelligent Upscaling of Static and Dynamic Reservoir Properties", *SPE 124477, Proceedings*, 2009 SPE Annual Conference & Exhibition. 5-10 October 2009, New Orleans, Louisiana.

Gomez, Y., Khazaeni, Y., Mohaghegh, S. D. and Gaskari, R.; "Top-Down Intelligent Reservoir Modeling (TDIRM)", *SPE 124204, Proceedings*, 2009 SPE Annual Conference & Exhibition. 5-10 October 2009, New Orleans, Louisiana.

Shahab D. Mohagegh, "Top-Down Intelligent Reservoir Modeling (TDIRM); A New Approach In Reservoir Modeling By Integrating Classic Reservoir Engineering With Artificial Intelligence & Data Mining Techniques", AAPG 2009 Annual Convention and Exhibition*, Denver, Colorado. June 7-10, 2009*.

Jalal Jalali, Shahab D. Mohagegh, "Detection of CO2 Seepage from Geological Sequestration Sites Using an Array of Downhole Pressure Gauges", E*ighth Annual Conference on Carbon Capture and Sequestration - DOE/NETL, Pittsburgh, PA. May 4 - 7, 2009*.

Jalal Jalali, Shahab D. Mohagegh, "Comprehensive Analysis of Enhanced CBM Production via CO2 Injection Using a Surrogate Reservoir Model", E*ighth Annual Conference on Carbon Capture and Sequestration - DOE/NETL, Pittsburgh, PA. May 4 - 7, 2009*.

2007

Delal Gunaydin, Shahab D. Mohagegh, Razi Gaskar & Kashy Aminian, "Estimation of Skin Factor by Using Pressure Transient Testing Results of a Single Rate Well Test", *SPE 111204, Proceedings*, 2007 SPE Eastern Regional Conference & Exhibition. 17-19 October 2007, Lexington, Kentucky.

Domingo Mata, Razi Gaskar and Shahab D. Mohagegh, "Field-Wide Reservoir Characterization Based on a New Technique of Production Data Analysis", *SPE 111205, Proceedings*, 2007 SPE Eastern Regional Conference & Exhibition. 17-19 October 2007, Lexington, Kentucky.

2006

Kazim Malik, Shahab Mohagegh, Razi Gaskar, "An Intelligent Portfolio Management Approach to Gas Storage Field Deliverability Maintenance and Enhancement; Part One Database Development & Model Building", *SPE 104571, Proceedings*, 2006 SPE Eastern Regional Conference & Exhibition. 11-13 October 2006, Canton, Ohio.

Gaskari, R., Mohaghegh, S. D., "Estimating major and Minor Natural Fracture pattern in Gas Shales Using Production Data", *SPE 104554, Proceedings*, 2006 SPE Eastern Regional Conference & Exhibition. 11-13 October 2006, Canton, Ohio.

Jalal Jalali, Shahab D. Mohaghegh, Razi Gaskari, "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. 11-13 October 2006, Canton, Ohio.

Shahab D. Mohaghegh, Hafez Hafez, Razi Gaskari, Masoud Haajizadeh, and Maher Kenawy, "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. 5-8 November 2006, Abu Dhabi, U.A.E.

Tovar, M., Mohaghegh, S. D., "Use of Water Injection for CO2 Sequestration in Coalbeds", 23rd Annual International Pittsburgh Coal Conference. September 25 - 28, 2006, Pittsburgh, Pennsylvania.

Mohaghegh, S. D., "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.

Gaskari, R., Mohaghegh, S. D., Jalali, J..: "An Integrated Technique for Production Data Analysis with Application to Mature Fields", *SPE 100562, Proceedings*, 2006 SPE Gas Technology Symposium, 15-17 May 2006, Calgary, Alberta, Canada.

Mohaghegh, S. D., Modavi, A., Hafez, H. , Haajizadeh, M., Kenawy, M., and Guruswamy, S.: "Development of Surrogate Reservoir Models (SRM) For Fast Track Analysis of Complex Reservoirs ", *SPE 99667, Proceedings*, 2006 SPE Intelligent Energy Conference and Exhibition, 11-13 April 2006, Amsterdam, The Netherlands.

2005

Mohaghegh, S. D., Gaskari, R., Popa, A., Salehi. I. and Ameri, S.: "Analysis of Best Hydraulic Fracturing Practices in the Golden Trend Fields of Oklahoma", *SPE 95942, Proceedings*, 2005 SPE Annual Conference and Exhibition, October 9-12, Dallas, Texas.

Maricic, N. Mohaghegh, S. D., Artun, E.: "A Parametric Study on the Benefits of Drilling Horizontal and Multilateral Wells in Coalbed Methane Reservoirs", *SPE 96018, Proceedings*, 2005 SPE Annual Conference and Exhibition, October 9-12, Dallas, Texas.

Mohaghegh, S. D., Gaskari, R., Jalali, J.: "A New Method for Production Data Analysis to Identify New Opportunities in Mature Fields: Methodology and Application", *SPE 98010, Proceedings*, 2005 SPE Eastern Regional Conference and Exhibition, September 14 – 16, Morgantown, West Virginia.

Mohaghegh, S. D., Nunsavathu, U.N., Tovar, M., Jalal, J., Maricic, N., Gaskari, R. and Ameri, S.: "Development of a Series of National Coalbed Methane Databases", *SPE 98011, Proceedings*, 2005 SPE Eastern Regional Conference and Exhibition, September 14 – 16, Morgantown, West Virginia.

Artun, E., Mohaghegh, S. D., Toro, J., Wilson, T. and Sanchez, A.: "Reservoir Characterization with Intelligent Seismic Inversion", *SPE 98012, Proceedings*, 2005 SPE Eastern Regional Conference and Exhibition, September 14 – 16, Morgantown, West Virginia.

Rolon, L. F., Mohaghegh, S. D., Ameri, S. Gaskari, R. and McDaniel, B.: "Developing Synthetic Well Logs for the Upper Devonian Units in Southern Pennsylvania", *SPE 98013, Proceedings*, 2005 SPE Eastern Regional Conference and Exhibition, September 14 – 16, Morgantown, West Virginia.

2004

Jalali, J., and Mohaghegh, S. D.: "A Coalbed Methane Reservoir Simulator Designed and Developed for the Independent Producers", *SPE 91414, Proceedings*, 2004 SPE Eastern Regional Conference and Exhibition, September 15 – 17, Charleston, West Virginia.

Garcia, A., and Mohaghegh, S. D.: "Forecasting U.S. Natural Gas Production Into Year 2020: A Comparative Study", *SPE 91413, Proceedings*, 2004 SPE Eastern Regional Conference and Exhibition, September 15 – 17, Charleston, West Virginia.

Mohaghegh, S. D., Popa, A., Gaskari, R., Wolhart, S., Seigfreid, R., and Ameri, S.: "Determining In-Situ Stress Profiles from Logs", *SPE 90070, Proceedings*, 2004 SPE Annual Conference and Exhibition, September 26 – 29, Houston, Texas.

Mohaghegh, S. D.: "Recent Development in Application of Artificial Intelligence in Petroleum Engineering", *SPE 89033, solicited by SPE,* to be considered for JPT's Distinguished Author Series, May 2004.

2003

Mohaghegh, S.D.: "Essential Components of an Integrated Data Mining Tool for the Oil and Gas Industry, With an Example Application in the DJ Basin", *SPE 84441, Proceedings*, 2003 SPE Annual Conference and Exhibition, October 5-8, Denver, Colorado.

Popa, A., Mohaghegh, S.D., Gaskari, R., and Ameri, S.: "Identification of Contaminated Data in Hydraulic Fracturing Databases: Application to the Codell Formation in the DJ Basin", *SPE 83446, Proceedings*, 2003 SPE Western Regional Conference and Exhibition, May 20 – 24, Long Beach, California.

2002

Reeves, S., Mohaghegh, S.D., Fairborn, J., and Luca, G.: "Feasibility Assessment of a New Approach for Integrating Multi-Scale Data for High-Resolution Reservoir Characterization", *SPE 77759, Proceedings*, 2002 SPE Annual Conference and Exhibition, September 29 – October 2, San Antonio, Texas.

Mohaghegh, S.,Hutchins, L. and Sisk, C.: "Prudhoe Bay Oil Production Optimization: Using Virtual intelligence Techniques, Stage One: Neural model Building", *SPE 77659, Proceedings*, 2002 SPE Annual Conference and Exhibition, September 29 – October 2, San Antonio, Texas.

Mohaghegh, S., Popa, A., Gaskari, R., Ameri, S., and Wolhart, S.: "Identifying Successful Practices in Hydraulic Fracturing Using Intelligence Data Mining Tools; Application to the Codell Formation in the DJ Basin", *SPE 77597, Proceedings*, 2002 SPE Annual Conference and Exhibition, September 29 – October 2, San Antonio, Texas.

2001

Mohaghegh, S., Gaskari, R., Popa, A., Ameri, S., and Wolhart, S.: "Identifying Best Practices in Hydraulic Fracturing Using Virtual Intelligence Techniques", *SPE 72385, Proceedings*, 2001 SPE Eastern Regional Conference and Exhibition, October 17-19, North Canton, Ohio.

2000

Mohaghegh, S., Goddard, C., Popa, A., Ameri, S., and Bhuiyan, M.: "Reservoir Characterization Through Synthetic Logs", *SPE 65675, Proceedings*, 2000 SPE Eastern Regional Conference and Exhibition, October 17-19, Morgantown, West Virginia.

Reeves, S., Bastian, P., Spivey, J., Flumerfelt, R., Mohaghegh, S., and Koperna, G.: "Benchmarking of Restimulation Candidate Selection Techniques in Layered, Tight Gas Sand Formations Using Reservoir Simulation", *SPE 63096, Proceedings*, SPE Annual Technical Conference and Exhibition, Dallas, TX, 1 – 4 October 2000.

Mohaghegh, S., Reeves, S., and Hill D.: "Development of an Intelligent Systems Approach to Restimulation Candidate Selection", *SPE 59767, Proceedings*, SPE Gas Technology Symposium, Calgary, Alberta, April 2000.

1999

Mohaghegh, S., Koperna, G., Popa, A. S. and Hill, D. G.: "Reducing the Cost of Field-Scale Log Analysis Using Virtual Intelligence Techniques", *SPE 57454, Proceedings*, 1999 SPE Eastern Regional Conference and Exhibition, October 21-22, Charleston, West Virginia.

Mohaghegh, S., Mohamad, K., Popa, A. S. and Ameri, S.: "Performance Drivers in Restimulation of Gas Storage Wells", *SPE 57453, Proceedings*, 1999 SPE Eastern Regional Conference and Exhibition, October 21-22, Charleston, West Virginia.

Mohaghegh, S., Popa, A. S. and Ameri, S.: "Intelligent Systems Can Design Optimum Fracturing Jobs", *SPE 57433, Proceedings*, 1999 SPE Eastern Regional Conference and Exhibition, October 21-22, Charleston, West Virginia. **This article appeared in JPT October 1999 issue page 30**.

Reeves, S. R., Hill, D. G., Hopkins, C. W., Conway, M. W., Tiner, R. L., and Mohaghegh, S. D.: "Restimulation Technology for Tight Gas Sand Wells", *SPE 56482, Proceedings*, 1999 SPE Technical Conference and Exhibition, October 3-6, Houston, Texas.

Reeves, S. R., Hill, D. G., Tiner, R. L., Bastian, P. A., Conway, M. W., and Mohaghegh, S. D.: "Restimulation of Tight Gas Sand Wells in the Rocky Mountain Region", *SPE 55627, Proceedings*, 1999 SPE Rocky Mountain Region Meeting, May 15-18, Gillette, Wyoming.

1998

Mohaghegh, S., Richardson, M., Ameri, S.: "Virtual magnetic Resonance Imaging Logs: Generation of Synthetic MRI logs from Conventional Well Logs", *SPE 51075, Proceedings*, 1998 SPE Eastern Regional Conference and Exhibition, November 9-11, Pittsburgh, PA.

Mohaghegh, S., Platon, V., Ameri, S.: "Candidate Selection for Stimulation of Gas Storage Wells Using Available Data With Neural Networks and Genetic Algorithms", *SPE 51080, Proceedings*, 1998 SPE Eastern Regional Conference and Exhibition, November 9-11, Pittsburgh, PA.

Bilgesu, I., Altmis, U., Ameri, S., Mohaghegh, S., and Aminian, K.: "A New Approach to Prediction Bit Life Based on Toothor Bearing Failures", *SPE 51082, Proceedings*, 1998 SPE Eastern Regional Conference and Exhibition, November 9-11, Pittsburgh, PA.

1997

Bilgesu, I., Tetrick, T., Altmis, U., Mohaghegh, S., and Ameri, S.: "A New Approach for the Prediction of Rate of Penetration (ROP) Values ", *SPE 39231, Proceedings*, 1997 Eastern Regional Conference and Exhibition, October 22-24, Lexington, KY.

1996

Mohaghegh, S., Balan, B., McVey, D., and Ameri, S.: "A Hybrid Neuro-Genetic Approach to Hydraulic Fracture Treatment Design and Optimization", *SPE 36602, Proceedings*, SPE 71st Annual Technical Conference, October 6-9, 1996, Denver, Colorado.

Mohaghegh, S. Hefner, H., Ameri, S.: Fracture Optimization eXpert (FOX): How

Computational Intelligence Helps the Bottom-Line in Gas Storage, *SPE 37341*, Proceedings, SPE Eastern Regional Conference and Exhibition, 23-25 October 1996, Columbus, Ohio.

1995

Mohaghegh, S., McVey, D., Aminian, K., and Ameri, S., "Predicting Well Stimulation Results in a Gas Storage Field in the Absence of Reservoir Data, Using Neural Networks", *SPE 31159,* October 1995.

Mohaghegh, S., Balan, B., and Ameri, S., "State-of-the-art in Permeability Determination From Well Log Data, Part 2: Verifiable, Accurate Permeability Predictions, the Touch Stone of All Models," *SPE 30979, Proceedings*, SPE Eastern Regional Conference and Exhibition, September 19-21, 1995, Morgantown, West Virginia.

Balan, B., Mohaghegh, S., and Ameri, S., "State-of-the-art in Permeability Determination From Well Log Data, Part 1: A Comparative Study, Model Development," *SPE 30978, Proceedings*, SPE Eastern Regional Conference and Exhibition, September 19-21, 1995, Morgantown, WV.

White, A., Molnar, D., Aminian, K., and Mohaghegh, S., "The Application of Artificial Neural Networks to Zone Identification in a Complex Reservoir," *SPE 30977, Proceedings*, SPE Eastern Regional Conference and Exhibition, September 19-21, 1995, Morgantown, West Virginia.

Ternyik, J., Bilgesu, I., and Mohaghegh, S., "Virtual Measurement in Pipes, Part 2: Liquid Holdup and Flow Pattern Correlation," *SPE 30976, Proceedings*, SPE Eastern Regional Conference and Exhibition, September 19-21, 1995, Morgantown, West Virginia.

Ternyik, J., Bilgesu, I., Mohaghegh, S., and Rose, D., "Virtual Measurement in Pipes, Part 1: Flowing Bottomhole Pressure Under Multi-phase Flow and Inclined Wellbore Conditions," *SPE 30975, Proceedings*, SPE Eastern Regional Conference and Exhibition, September 19-21, 1995, Morgantown, West Virginia.

Carriere. P., Mohaghegh, S., and Madabhushi, B.: "Removal of Volatile Organic Compounds (VOCs) Using Biofilters," 27th Mid-Atlantic Industrial and Hazardous Waste Conference, July 9-12, 1995, Lehigh University, Pennsylvania.

1994

Mohaghegh, S., "Artificial Neural Networks as a Valuable Tool for Petroleum Engineers", *SPE 29220,* November 1994.

Mohaghegh, S., and Gadde, R.: "Biodesulfurization of West Virginia Bituminous Coal," *Proceedings*, The Tenth Annual Symposium of The Ohio River Basin Consortium for Research and Education, Huntington, WV. Oct. 30 - Nov. 1, 1994.

McVey, D., Mohaghegh, S., and Aminian, K.: "Identification of Parameters Influencing the Response of Gas Storage Wells to Hydraulic Fracturing With the Aid of a Neural Network," *SPE 29159, Proceedings*, SPE Eastern Regional Conference and Exhibition, November 8-10, 1994, Charleston, West Virginia.

Mohaghegh, S., Arefi, G. R., Ameri, S., and Hefner, H.: "A Methodological Approach for Reservoir Heterogeneity Characterization Using Artificial Neural Networks," *SPE 28394, Proceedings*, SPE 69th Annual Technical Conference, September 25-28, 1994, New Orleans, Louisiana.

Mohaghegh, S., Arefi, G. R., and Ameri, S.: "Design and Development of an Artificial Neural Network for Estimation of Formation Permeability," *SPE 28237, Proceedings*, SPE Petroleum Computer Conference, July 31- August 3, 1994, Dallas, Texas.

Mohaghegh, S., and Ameri, S.: "Enhancing Production and Management of Hydrocarbons Using Advanced Information Technologies," *Proceedings*, Second Annual Conference on Technological Advancement in Developing Countries, Columbia University, July 24-26, 1994, New York, N.Y.

1993

Mohaghegh, S., Ameri, S., Aminian, K., and Chatterjee, U.: "Performance Evaluation of a Waterflood Project in Southern West Virginia," *SPE 26937*, *Proceedings*, SPE Eastern Regional Meeting, November 2-4, 1993, Pittsburgh, Pennsylvania

Mohaghegh, S., Ameri, S., and Aminian, K.: "A Simple Method for Evaluating Pore Surface Mineralogy," *SPE 26933*, *Proceedings*, SPE Eastern Regional Meeting, November 2-4, 1993, Pittsburgh, Pennsylvania.

Ameri, S., Aminian, K., and Mohaghegh, S.: "A Simple Method for Modeling Megascopic Heterogeneities in Fluid Flow Models in Porous Media." *Proceedings*, 9th International Conference on Mathematical and Computer Modeling, July 26-29, 1993. University of California, Berkeley. Berkeley, California.

Mohaghegh, S., Ertekin, T., and Bilgesu, H.I.: "Development of a New Mathematical Functional Group for Modeling Two-Phase Flow in Coalbed Methane Reservoirs." *Proceedings*, 9th International Conference on Mathematical and Computer Modeling, July 26-29, 1993. University of California, Berkeley. Berkeley, California.

Mohaghegh, S., and Aminian, K.: "Challenges, Strategies, and Tools of Petroleum Industry in Developing Countries, On the Eve of Twenty First Century." *Proceedings*, First Annual Conference on Technological Advancement in Developing Countries. July 24-25, 1993. Columbia University, New York, New York.

Ameri, S., Molnar, D., Mohaghegh, S., and Aminian, K.: "Permeability Evaluation in Heterogeneous Formations Using Geophysical Well Logs and Geological Interpretations," *SPE 26060*, *Proceedings*, SPE Western Regional Meeting, May 23-28, 1993. Anchorage, Alaska.

Mohaghegh, S., Aminian, K., Wallace, W., and Ameri, S.: "The Application of Modified Electron Microscopy for Detection of Clays in Reservoir Rock," *Proceedings*, AAPG Annual Convention, April 25-28, 1993. New Orleans, Louisiana.

Dascalescu, W., Mohaghegh, S., Aminian, K., and Ameri, S.: "Qualitative Reservoir Characterization Using Initial Production Data - Granny Creek Field, West Virginia," 24th Annual Appalachian Petroleum Geology Symposium, March 29-31 1993, Morgantown, West Virginia.

1991

Mohaghegh, S., Ertekin, T.: "Production and Pressure Decline Curves for Wet-Gas Sands with Closed Outer Boundary," *SPE 23442, Proceedings*, SPE Eastern Regional Meeting, Oct 22 -25, 1991. Lexington, Kentucky.

Mohaghegh, S., Ertekin, T.: "A Type Curve Solution for Coal Seam Degasification Wells Producing Under Two-Phase Flow Conditions," *SPE 22673, Proceedings*, SPE 66th Annual Technical Conference and Exhibition, Oct. 6 - 9, 1991. Dallas, Texas.

1990

Mohaghegh, S., Ertekin, T.: "Production Decline Curves for Low Pressure Gas Reservoirs Undergoing Simultaneous Water Production," *SPE 21269, Proceedings*, SPE Eastern Regional Meeting, Oct. 31 - Nov. 2, 1990. Columbus, Ohio.

1988

Rai, C., Mohaghegh, S.: "Microbial Desulfurization of Texas Lignite," *American Chemical Society,* Regional Meeting, Dec. 1988, Corpus Christy, Texas.

PRESENTATIONS AS INVITED SPEAKER (Last 5 Years)

National Oilwell Varco (NOV). Houston, Texas. Application of Machine Learning to Drilling Hydrocarbon Wells. December 23, 2016.

DOE-NETL & Princeton University (Mechanical Eng.). Webinar. Smart Proxy – Machine Learning Application in Computational Fluid Dynamic. December 20, 2016.

ADNOC. Abu Dhabi, UAE. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. December 14, 2016.

ADCO. Abu Dhabi, UAE. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. December 13, 2016.

Petronas, MPM. Kuala Lumpur, Malaysia. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. November 21, 2016.

Statoil, Austin, Texas. Shale Analytics – Applies to Eagle Ford. August 29, 2016.

Schlumberger, Online Webinar. Reservoir Management with Big Data Analytics Innovation during the Market Downturn. August 22, 2016.

DOE-NETL Workshop on CFD, Morgantown, WV. Smart CFD Proxy; Replicating CFD Results Accurately & at High Speed. August 9, 2016.

Aramco Service Company, Houston, Ahead of the Bit; Analyses, Modeling & Optimization of Drilling Operations; Ahead of the Bit. August 5, 2016.

Chevron, Houston, Texas. Reservoir Management with Big Data Analytics Innovation during the Market Downturn. August 4, 2016.

Unconventional Resources Technology Conference, San Antonio, Texas. Fact-Based Re-Frac Candidate Selection and Design in Shale – A Case Study in Application of Data Analytics. August 2, 2016.

Statoil, Austin, Texas. Shale Analytics – Applies to Eagle Ford. August 1, 2016.

Petronas, MPM. Kuala Lumpur, Malaysia. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. July 25, 2016.

Schlumberger, Online Webinar. Reservoir Management with Big Data Analytics Innovation during the Market Downturn. July 11, 2016.

Penn State University, State College, PA. Data-Driven Smart Proxies. Replicating Numerical Model Results at High Speed; Can CFD Benefit from Surrogate Modeling? June 24, 2016.

ADMA, Abu Dhabi, UAE. Reservoir Management with Big Data Analytics Innovation during the Market Downturn. June 2, 2016.

PetroForce, Online Webinar. Reservoir Management with Big Data Analytics Innovation during the Market Downturn. May 24, 2016.

Shale Innovation Contest, Pittsburgh, PA. Shale Analytics - Production Optimization Technology – SPOT. May 18, 2016.

Exaro, Online Webinar. Shale Analytics - Production Optimization Technology – SPOT. April 14, 2016.

Exaro, Houston, Texas. Shale Analytics - Production Optimization Technology – SPOT. March 11, 2016.

Statoil, Houston, Texas. Shale Analytics - Production Optimization Technology – SPOT. March 10, 2016.

SPE Workshop, Kuala Lumpur, Malaysia. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. February 24, 2016.

Petronas, MPM. Kuala Lumpur, Malaysia. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. February 23, 2016.

SPE Workshop Panel Session, Kuala Lumpur, Malaysia. Maximizing Asset Value through Data Science and Analytics. Where are we now? February 22, 2016.

Total E&P, USA, Online Webinar. Petroleum Data Analytics - Application to Utica Shale. February 9, 2016.

SPE Local Chapter, Abu Dhabi, UAE. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. January 20, 2016.

SPE Forum on Reservoir Management, Dubai, UAE. Reservoir Management with Big Data Analytics; Innovation during the Market Downturn. January 18, 2016.

ADCO, Abu Dhabi, UAE. Top-Down Modeling of Bu Hasa; Data-Driven Reservoir Modeling. January 14, 2016.

DOE-NETL, Morgantown, West Virginia. Data-Driven Smart Proxies. Replicating Numerical Model Results at High Speed; Can CFD Benefit from Surrogate Modeling? January 11, 2016.

IPTC 2015 (Ask an Expert). Doha, Qatar. Data: An E&P Asset Reservoir Management Case Studies in the Middle East. December 7, 2015.

SPE Live Webinar. The Game Changing Impact of Data & Data-Driven Solutions in the Upstream Oil & Gas Industry. November 24, 2015.

EQT, Pittsburgh, PA. Fact-Based Modeling of Production from Shale. November 19, 2015.

ADIPEC 2015, Abu Dhabi, United Arab Emirates. Research and Development in Academic Environment (Panel Session). November 12, 2015.

ADIPEC 2015, Abu Dhabi, United Arab Emirates. Smart Proxy Big Data Analytics in Reservoir Management (Panel Session). November 12, 2015.

ADIPEC 2015, Abu Dhabi, UAE. Smart Proxy: an Innovative Reservoir Management Tool; Case Study of a Giant Mature Oilfield in the UAE. November 10, 2015.

Paradigm, Online Webinar. Applications of Advanced Data-Driven Analytics in the drilling. November 3, 2015.

Statoil Canada. Calgary, Canada. Petroleum Data Analytics. October 20, 2015.

Reliance Holdings. Houston, Texas. Fact-Based Modeling of Production from Shale. October 15, 2015.

SAS – Texas A&M University Data Analytics Workshop. Houston, Texas. Smart Proxy Modeling for Numerical Reservoir Simulations. October 15, 2015.

SPE Live Webinar. Smart Proxy Modeling for Numerical Reservoir Simulations. October 6, 2015.

Saudi Aramco, Online Webinar. Applications of Advanced Data-Driven Analytics in the drilling. October 3, 2015.

Schlumberger In-House Analytic Workshop, Houston, Texas. Applications of Advanced Data-Driven Analytics in the Upstream Oil and Gas Industry. October 1, 2015.

Houston Oil and Gas Data Analytics, Houston, Texas. Petroleum Data Analytics. September 30, 2015.

Advance Energy Partners, Houston, Texas. Fact-Based Modeling of Production from Shale. September 30, 2015.

Reserve Estimation of Unconventionals, Houston, Texas. Fact-Based Modeling of Production from Shale. August 13, 2015.

Unconventional Resources Technology Conference, San Antonio, Texas. Formation vs. Completion: Determining the Main Drivers behind Production from Shale? A Case Study Using Data-Driven Analytics. July 21, 2015.

SPE R&D Webinar Series, Online Webinar. Data Driven Analytics in the Upstream Oil and Gas Industry. July 9, 2015.

National Energy Technology Laboratory - DOE, Morgantown, West Virginia. Data-Driven Smart Proxies. Replicating Numerical Model Results at High Speed; Can CFD Benefit from Surrogate Modeling? May 11, 2015.

C3 Energy, Bay Area, California. Advanced Data-Driven, Analytics for the Upstream Oil and Gas Industry. April 2, 2015.

Virginia Tech University, Blacksburg, VA. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. March 30, 2015.

Baker, Baker's Distinguished Lecture program. Houston, Texas. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. March 25, 2015.

Weatherford, Houston, Texas. Modern, Intelligent Drilling Advisory System, MIDAS. March 5, 2015.

Houston Area's Data Science Gathering, Houston, Texas. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. March 3, 2015.

Total S.A., Presentation to Total's professionals in charge of unconventional assets. Houston, Texas. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. March 3, 2015.

SPE's Reservoir Management, Applied Technology Workshop. Abu Dhabi, UAE. Data Driven Reservoir Management. February 11, 2015.

SPE's Petroleum Data-Driven Analytics, Applied Technology Workshop. Galveston, Texas. Data Driven Reservoir Modeling. November 19, 2014.

SPE's Petroleum Data-Driven Analytics, Applied Technology Workshop. Galveston, Texas. Reservoir Characterization of Shale Assets. November 19, 2014.

SPE ATCE 2014. Amsterdam, the Netherland. Data-Driven Reservoir Management of a Giant Mature Oilfield in the Middle East. October 29, 2014.

Anadarko Petroleum Corporation, Presentation to Anadarko professionals of Eagle Ford and Wattenberg assets. Denver, CO.

Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. October 7, 2014.

University of Texas at Austin, Petroleum Engineering Graduate Seminar, Austin Texas. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. September 8, 2014.

University of Southern California, Petroleum Engineering Graduate Seminar, Los Angeles, California. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. September 4, 2014.

University of Southern California, CiSoft Seminar, Los Angeles, California. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. September 4, 2014.

U.S. Department of Energy Carbon Capture and Storage Conference, Pittsburgh, PA. CO2 MVA Using Smart Oilfield Technology. August 12, 2014.

Anadarko Petroleum Corporation, Presentation to Anadarko professionals of Eagle Ford and Wattenberg assets. Denver, CO. Data-Driven Analytics for Unconventionals. July 9, 2014.

Weatherford International, Presentation to Weatherford professionals Houston, Texas. Application of Data-Driven Analytics in the Upstream Oil and Gas Industry. June 30, 2014.

AAPG Conference, Pittsburgh, PA. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. June 17, 2014.

SPEE Annual Conference, Stowe, Vermont. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. June 6, 2014.

ADCO – Bab Asset, Abu Dhabi, United Arab Emirates. Development of Surrogate Reservoir Model for Bab. March 9, 2014.

ADCO – BuHasa Asset, Abu Dhabi, United Arab Emirates. Development of Top-Down Model for BuHasa. March 7, 2014.

Drilling Conference. Fort Worth, Texas. Drilling Ahead of the Bit – Advanced Data-Driven Analytics in Drilling. March 1, 2014.

Abu Dhabi Marine Operation Company. Abu Dhabi, United Arab Emirates. Fact-Based Modeling; Data-Driven Reservoir Management of Mature Field. December 12, 2013.

Marcellus Shale Extraction Seminar. Pittsburgh, PA. Shale Extraction Modeling Technology – Validating and Verifying Models for Enhanced Production in Marcellus Shale. December 9, 2013.

STATOIL, Presentation to STATOIL Research Group in Houston Texas. Online via WebEx. Fact-Based Modeling; Data-Driven, Predictive Analytics for Unconventionals. November 25, 2013.

SPE Live Webinar, Streaming to a live audience. Archived for on-demand view. Shale Asset Management via Advanced Data-Driven and Predictive Analytics. November 13, 2013. (http://eo2.commpartners.com/users/spe/session.php?id=11557)

Abu-Dhabi International Petroleum Exhibition & Conference (ADIPEC), Abu Dhabi, United Arab Emirates. Top-Down Modeling (TDM) of a Mature Giant Oilfield in the Middle East; Simultaneous History Matching of Production, Static Pressure and Time-Lapse Saturation. November 10, 2013.

SPE Intelligent Energy Conference, Keynote Speaker, Dubai, United Arab Emirates. Fact-Based Modeling; a New Modeling Paradigm in the Exploration & Production Industry. October 29, 2013.

Weatherford Business Unit, Calgary, AB, Canada. Reservoir and Production Management of Shale Assets. October 17, 2013.

SPE Technical Workshop on Production Forecasting, Banff, AB, Canada. Production Forecasting in Shale Reservoirs, a Paradigm Shift in Analysis. October 16, 2013.

SPE Live Webinar, Streaming to a live audience. Archived for on-demand view. Smart Fields; A Data-Driven Approach to Making Oilfields Smart. September 11, 2013. (http://eo2.commpartners.com/users/spe/session.php?id=11277)

DOE Carbon Capture and Storage Review Conference, Pittsburgh, PA. CO_2-MVA and Leakage Detection using Smart Field Technology. August 2013.

SPE Eastern Regional Conference, Pittsburgh, PA. A Critical View of Reservoir Modeling in Shale. August 2013.

Reserve Estimation of Unconvetionals Conference, Houston, Texas. Hydraulic Fracture Analysis and Modeling in Shale. August 2013.

ExxonMobil, Houston, Texas. Virtual Multi-Phase Flow Metering – Data Driven Analytics for Reservoir Surveillance. August 2013.

Anadarko, the Woodlands, Texas. Hydraulic Fracture Analysis and Modeling in Shale. August 2013.

Nexen Energy Annual Technical Conference, Canmore, AB, Canada. Keynote Opening Speech, Hydraulic Fracture Analysis and Modeling in Shale. June 2013.

NRAP Review Meeting, Pittsburgh, PA. Title: Second and Third Generation Reduced Order Model Using SRM for CO_2 Storage Modeling. May 2013.

RPSEA Marcellus Shale Forum, Canonsburg, PA. Title: Top-Down Modeling of Marcellus Shale Asset in Southwestern PA. May 2013.

Turkmen Petroleum Institute, Ashkhabad, Turkmenistan. Title: Drilling and Completion in Unconventional Reservoirs. May 2013.

US-Turkmen Business Forum, Ashkhabad, Turkmenistan. Title: Impact of Unconventional Resources in Global Gas Production (Member of International Panel – Invitation by US Embassy in Turkmenistan). April 2013.

Digital Energy Conference, the Woodlands, Texas. Title: Synthetic, Geomechanical Logs for Marcellus Shale. March 2013.

Shell Exploration & Production, Sewickley, PA. Title: Hydraulic Fracture Analysis and Modeling in Shale. February 2013.

SPE Applies Technical Workshop on "How To Turn Brown Fields Green" Abu Dhabi, United Arab Emirates. Invited Speaker. Title: Top-Down Modeling of a Giant Mature Oilfield in the Middle East. December 2012.

SPE Forum on "Innovations in Reservoir Simulation and Modeling" Santa Fe, New Mexico. Invited Speaker. Title: Surrogate Reservoir Modeling, Using Data Mining and Machine Learning. November 2012.

CoalSeq Conference, Pittsburgh, PA. Invited Speaker. Title: Numerical and Artificial Intelligence Modeling of CO2 Sequestration in Depleted Shale Reservoirs. October 2012.

DOE Major Peer Review Meeting, Pittsburgh, PA. Title: MVA of CO2 Projects using Smart Field Technology. October 2012.

DOE Major Project Review Meeting, Pittsburgh, PA. Title: MVA of CO2 Projects using Smart Field Technology. August 2012.

Nexen Corporation, Calgary, AB, Canada. Title: Data-Driven Modeling of Hydraulic Fracturing in Shale. July 2012.

Fekete Engineering & Software Services, Calgary, AB, Canada. Title**:** Data-Driven Modeling of Hydraulic Fracturing in Shale. May 2012.

Western Regional Conference, Bakersfield California. Title: Application of Well-Based Surrogate Reservoir Models (SRMs) to Two Offshore Fields in Saudi Arabia, Case Study. March 2012.

Western Regional Conference, Bakersfield California. Title: Grid-Based Surrogate Reservoir Modeling (SRM) for Fast Track Analysis of Numerical Reservoir Simulation Models at the Grid block Level. March 2012.

Operational Research and Data Mining Conference, Cancun, Mexico. Invited Keynote Speaker Title**:** AI-Based Reservoir Simulation and Modeling. March 2012.

Occidental Petroleum Corporation, Houston, Texas. Title: Technical Aspects of AI-Based Reservoir Modeling. March 2012.

Hess Corporation, Houston, Texas. Title: Data-Driven Modeling of Hydraulic Fracturing in Shale. February 2012.

Range Resources. Canonsburg, PA. Title: Predictive Data Mining Analysis of Hydraulic Fracturing in Marcellus Shale. November 2011.

Total. Pau, France. September 2011. Title: Technical Aspects of AI-Based Reservoir Modeling.

Total. Paris, France. September 2011. Title: AI-Based Reservoir Modeling a Reservoir Management Approach.

Middle East Oil Show 2011 – Panel Discussion on Technology Advancement; how Fast? Manama, Bahrain. September 2011. Title: A Paradigm Shift in Problem Solving in the Exploration and Production Industry.

Abu Dhabi Co. for Onshore Oil Operation (ADCO). Abu Dhabi, UAE. September 2011. Title: AI-Based Reservoir Modeling using Field data; Top-Down Modeling.

Range Resources. Canonsburg, PA. Title: Descriptive Data Mining Analysis of Hydraulic Fracturing in Marcellus Shale. August 2011.

SPE Forum on Reservoir Management. Santa Fe, New Mexico. May 2011. Title: AI-Based Reservoir Modeling.

Instituto Mexicano del Petroleo. Mexico City, Mexico. April 2011. Title: AI-Based Reservoir Modeling.

SPE Digital Energy Conference. The Woodlands, Texas. April 2011. Title: Reservoir Simulation and Modeling Based on Pattern Recognition.

SPE Digital Energy Conference. The Woodlands, Texas. April 2011. Title: Modeling, History Matching, Forecasting and Analysis of Shale Reservoirs Performance Using Artificial Intelligence.

BP. Houston, Texas. February 2011. Title: AI-Based Reservoir Modeling – Top-Down, Intelligent Reservoir Modeling and Surrogate Reservoir Modeling.

SHORT COURSES TAUGHT TO THE INDUSTRY

Top-Down Modeling,

- ➢ Duration: Two Days Short Course. Location: Houston, Texas. April 20-21, 2016.

Shale Analytics,

- ➢ Duration: One Day Short Course. Location: Calgary, Canada. October 20, 2016. In Association with SPE Workshop on Unconventional Resources 2016.

Shale Reservoir & Production Management using Advanced Data-Driven Analytics,

- ➢ Duration: One Day Short Course. Location: Calgary, Canada. October 19, 2015. In Association with SPE Workshop on Unconventional Resources 2015.

- ➢ Duration: One Day Short Course. Location: Houston, Texas. September 27, 2015. In Association with SPE Annual Technical Conference & Exhibition (ATCE) 2015.

- ➢ Duration: One Day Short Course. Location: The Woodlands, Texas. March 2, 2015. In Association with SPE Digital Energy Conference 2015.

- ➢ Duration: One Day Short Course. Location: Stowe, Vermont. June 6 2014. In Association with SPEE Annual Conference 2014.

Oilfield Data Mining,

- ➢ Duration: One Day Short Course. Location: Abu Dhabi, United Arab Emirates. November 8, 2015. In Association with ADIPEC 2015.

- ➢ Duration: One Day Short Course. Location: Abu Dhabi, United Arab Emirates. November 11, 2014. In Association with ADIPEC 2014.

- ➢ Duration: Two Days Short Course. Location: Amsterdam, the Netherlands. October 2014. In Association with SPE ATCE 2014.

- ➢ Duration: Two Days Short Course. Location: Houston, Texas. Date: May 6-7, 2014.

- ➢ Duration: One Day Short Course. Location: Abu Dhabi, United Arab Emirates. November 2013. In Association with ADIPEC 2013.

- ➢ Duration: One Day Short Course. Location: Dubai, United Arab Emirates. October 2013. In Association with SPE Intelligent Energy 2013.

- ➢ Duration: Two Days Short Course. Location: New Orleans, Louisiana. September 2013. In Association with SPE ATCE 2013.

- ➢ Duration: Two Days Short Course. Location: The Woodlands, Texas. March 2013. In Association with SPE Digital Energy Conference.

- ➢ Duration: Two Days Short Course. Location: San Antonio, Texas. October 2012.

In Association with SPE Annual Technical Conference.

- ➢ Duration: Four Days Short Course. Location: Buenos Aires, Argentina. July 2012.

- ➢ Duration: Two Days Short Course. Location: Houston, Texas. Date: February 7-8, 2012.

- ➢ Duration: Two Days Short Course. Location: Denver, Colorado. October 2011. In Association with SPE SPE Annual Technical Conference.

- ➢ Duration: Two Days Short Course. Location: The Woodlands, Texas. April 2011. In Association with SPE Digital Energy Conference.

- ➢ Duration: Two Days Short Course. Location: Houston, Texas: February 2011.

Data Driven Reservoir Management,

- ➢ Duration: Two Days Short Course. Location: Tehran, Iran. February 16, 2015.

Virtual Intelligence, and Its Applications in Oil & Gas Industry,

- o Duration: Two Days Short Course. Location: Florence, Italy: September 2010.

- o Duration: Two Days Short Course. Location: New Orleans, LA September 2009.

- o Duration: Four Days Short Course. Location: Villahermosa, Mexico: August 4-7, 2008.

- o Duration: Four Days Short Course. Location: Tehran, Iran: May 26-29, 2008.

- o Duration: Two Days Short Course. Location: Dhahran, Saudi Arabia. Date: April, 2007.

- o Duration: Four Days Short Course. Location: Sheraton, Abu Dhabi, U.A.E. Date: December 10-13, 2006.

- o Duration: Three Days Short Course. Location: International Oil Conference and Exhibition, Cancun, Mexico. Date: August 27-29, 2006.

- o Duration: One Day Short Course. Location: SPE/EAGE Reservoir Characterization & Simulation symposium, Dubai, United Arab Emirates. Date: December 10, 2005.

- o Duration: Five Days Short Course. Location: ADCO, Abu Dhabi Company for Onshore Oil Operations, Abu Dhabi, United Arab Emirates. In-House Training. Date: March 19 – 23, 2005.

- o Duration: Five Days Short Course. Location: ADCO, Abu Dhabi Company for Onshore Oil Operations, Abu Dhabi, United Arab Emirates. In-House Training. Date: May 29 – June 2, 2004.

- o Duration: Five Days Short Course. Location: ADCO, Abu Dhabi Company for Onshore Oil Operations, Abu Dhabi, United Arab Emirates. In-House Training. Date: May 22-26, 2004.

- o Duration: Five Days Short Course. Location: ADCO, Abu Dhabi Company for Onshore Oil Operations, Abu Dhabi, United Arab Emirates. In-House Training. Date: April 3-7, 2004.

- o Duration: Five Days Short Course. Location: King Fahad University of Petroleum & Mining, Dhahran, Saudi Arabia. Date: April 2002.

Production Optimization Using Artificial Intelligence & Data Mining (AI&DM),

- o Duration: Three Days Short Course. Location: Abu Dhabi, United Arab Emirates, In-House: ADCO. Date: December 21-23, 2009.
- o Duration: Three Days Short Course. Location: Rio de Janeiro, Brazil. Date: September 21-23, 2009.
- o Duration: One Day Short Course. Location: Tehran, Iran. Date: November 25, 2007
- o Duration: Three Days Short Course. Location: Sheraton, Abu Dhabi, U.A.E. Date: May11-13, 2007
- o Duration: Two Days Short Course. (In conjunction with SPE ATCE 2007). Location: Anaheim Convention Center, Anaheim, CA. Date: November 11-12, 2007
- o Duration: Two Days Short Course. Location: Denver, Colorado. Date: February 25-26, 2008
- o Duration: Four Days Short Course – In-House, PEMEX. Location: Villahermosa, Tabasco, Mexico. Date: July 21-24, 2008
- o Duration: Two Days Short Course. (In conjunction with SPE ATCE 2008). Location: Denver, Colorado. Date: September 21-22, 2008

Coalbed Methane Reservoir Engineering,

- o Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2001
- o Duration: One Day Short Course. Location: Coalbed Methane Forum, Morgantown, West Virginia. Date: October 2001
- o Duration: Two and a Half Days Short Course. Location: Tulsa, Oklahoma. Date: May 2002
- o Duration: Two Days Short Course. Location: Devon Energy Corporation, Oklahoma City, Oklahoma. Date: May 2002
- o Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2002
- o Duration: One Day Short Course. Location: Coalbed Methane Forum, Morgantown, West Virginia. Date: October 2002
- o Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2003
- o Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: February 2004
- o Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: February 2005
- o Duration: One Day Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: October 2005
- o Duration: One Day Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: October 30, 2007

EXPERIENCE

6/96-Present   ***INTELLIGENT SOLUTIONS, INC.***

Founder and President.

A solution provider and consulting firm for the oil and gas industry specializing in application of intelligent systems in petroleum and natural gas engineering.

6/02-Present   ***WEST VIRGINIA UNIVERSITY***

Professor, Department of Petroleum & Natural Gas Engineering.

6/97-6/02   ***WEST VIRGINIA UNIVERSITY***

Associate Professor, Department of Petroleum & Natural Gas Engineering.

8/91-6/97   ***WEST VIRGINIA UNIVERSITY***

Assistant Professor, Department of Petroleum & Natural Gas Engineering.

UNIVERSITY COURSES DEVELOPED & TAUGHT

A. *Undergraduate Level Courses:*

PNGE 191 – Visual Basic for Engineers and Scientists,
PNGE 434 – Applied Petroleum Reservoir Engineering,
PNGE 441 – Oil and Gas Property Evaluation,
PNGE 462 – Reservoir Simulation and Modeling,
PNGE 480 – Petroleum Engineering Design,
PNGE 460 – Well Stimulation Design,
M2 – Mineral Engineering Problem Solving.
ENGR 101 – Freshman Engineering Problem Solving and Design-I
ENGR 102 – Freshman Engineering Problem Solving and Design-II

B. *Graduate Level Courses:*

PNGE 584 – Advanced Pressure Transient Analysis,
PNGE 632 – Advanced Reservoir Simulation,
PNGE 691B – Computer Applications in Energy and Environmental Management,
PNGE 691C – Application of Intelligent Systems in Petroleum Engineering,
PNGE 691E – Advance Production Data Analysis
PNGE 791B – Shale Analytics

CONSULTING

Provided professional consulting services to:

Total S.A.
Royal Dutch Shell
Nexen, Inc.
Core Energy (Norway)
Saudi Aramco
BP
ASC Petroleum Consultants.
Halliburton Energy Services.
Chevron Petroleum Technology Company.
Gas Technology Institute.
Holditch Reservoir Technologies
New York State Energy Research and Development Authority
Advanced Resources International
Anadarko Petroleum Corporation
Pinnacle Technologies
BP-Amaco
Equitable Production Company
EOG Resources
Abu Dhabi Company for Onshore Oil Operation – ADCO
CDX Gas, LLC.
PEMEX
IMP (Instituto Mexicano del Petroleo)

HONORS/ PROFESSIONAL MEMBERSHIPS/ ACTIVITIES

Representing The Unites States in the International Organization for Standardization (ISO) for carbon dioxide capture, transportation, and geological storage (CCS) as a voting member of the US Technical Advisory Group. Designated U.S. Liaison for working group on Quantification and Verification.

Recipient of U.S. Secretary of Energy's Achievement Award for technical contribution to DOE's addressing of the Deepwater Horizon Oil Spill. November 2011.

Member of U.S. Department of Energy's "Unconventional Resources Technology Federal Advisory Committee". Appointed by the U.S. Secretary of Energy as a Subject Matter Expert. 2008-2010, 2010-2012, 2012-2014. This committee advises the Secretary of Energy directly and specifically on the Unconventional Resources research programs.

Society of Petroleum Engineers award for "Faculty Member of the Year", Northeast North American Region, 2016.

Society of Petroleum Engineers award for distinguished contribution in the area of "Reservoir Description and Dynamics Award", Northeast North American Region, 2007.

Society of Petroleum Engineers Distinguished Lecturer, 2007-2008.

Society of Petroleum Engineers Eastern Regional Technical Award, 2007.

Society of Petroleum Engineers Outstanding Associate Editor Award, 2008.

Society of Petroleum Engineers Distinguished Author:

- September 2000
- October 2000
- November 2000
- April 2005

Outstanding Professor in Petroleum & Natural Gas Engineering:

- Academic year 2005-2006
- Academic year 2003-2004
- Academic year 1999-2000
- Academic year 1995-1996
- Academic year 1994-1995

Associate Editor, SPE Reservoir Evaluation and Engineering Journal, 1997 – 1999 & 2007- present.

Member of the Editorial Board of International Journal of Oil, Gas and Coal

Technology.

Member of the Editorial Board of Journal of Natural Gas Sciences and Engineering.

Member of SPE Formation Evaluation Journal Technical Editorial Committee, 1995-97.

Member of SPE Reservoir Evaluation and Engineering Journal Technical Editorial Committee, 1999-Present.

Chair of SPE Book Committee, 2014-15

Founder and Chair of the Program committee, SPE Petroleum Data-Driven Analytics Technical Section (2011-2015).

Member of **SPE**, Society of Petroleum Engineers, since 1984.

Member of SPE Continuing Education Committee, 2005- 2012.

Member of the judging panel for the Graduate Students Paper Contest, Western Regional, April 2003.

Member of Graduate Faculty, Petroleum & Natural Gas Engineering, WVU

Member of Tau Beta Pi; National Engineering Honor Society, since 1985.

Member of Pi Epsilon Tau; Petroleum Engineering Honor Society, since 1985.