

# SHAHAB D. MOHAGHEGH

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## 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

- 1991 - 1993 ***Measuring and Predicting Reservoir Heterogeneity in Complex Deposystems***, Key Investigator, Grant No. DE-AC22-90BC 14657, Department of Energy, Pittsburgh Energy and Technology Center, \$1,300,000 (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, \$20,000.
- 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, \$56,000.
- 1993 - 1994 ***Treatment of Volatile Organic Compounds (VOCs) Using Biofilters***, Principal Investigator, Grant from West Virginia University=s Cooperative Agreement with U.S. Department of Energy, Morgantown Energy Technology Center, \$64,706.
- 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. Amount: \$1,000,000, for PNGE, in cooperation with Civil and Environmental Engineering and BDM as Consultant partner.
- 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. Amount: \$56,000.

- 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. Amount: \$8,000.
- 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. Amount: \$8,413.
- 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. Amount: \$51,200.
- 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. Amount: \$300,000 to date - \$75,000 per year (WVU Share: 50%). Consortium's research activities and its cooperation with the oil industry is an on going effort that is renewed on an annual basis.
- 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. Amount: \$22,400.
- 2000 - 2003 ***Teams of Interdisciplinary Graduate fellows Engaged to Reinvigorate Students to Science, Mathematics, Engineering and Technology***, Faculty Mentor, Funded by: National Science Foundation. Amount: \$57,000.
- 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. Amount: \$100,000. (WVU Share: \$30,000)
- 2000 - 2002 ***Development of Data Driven Computer Applications for Optimization of Upstream Petroleum Operations***, CO-Principal Investigator, Funded by Gas Technology Institute. Amount \$208,500.
- 2001 - 2003 ***Identification and Demonstration of Preferred Upstream Management Practices (PUMP) for the Oil Industry***, CO-Principal Investigator, Funded by US Department of Energy. Amount \$1,200,000. (WVU Share: \$233,500)
- 2002 - 2002 ***A Comprehensive Study to Enhance Gas Production in the Appalachian Basin***, CO-Principal Investigator, Funded by WVU research Corporation, Research Incentive Competitive Grant Program. Amount \$17,000.
- 2003 - 2005 ***An Intelligent Systems Approach to Reservoir Characterization***, Principal Investigator, Funded by U.S. Department of Energy. Amount \$343,600.
- 2004 - 2005 ***Northern Appalachian Basin Coal Bed Methane Assessment Project***, CO-Principal Investigator, Funded by Research Partnership to Secure Energy for America. Amount \$345,000.
- 2004 - 2005 ***Horizontal Well Configurations for CBM Production***, Principal Investigator, Funded by CDX Gas LLC. Amount \$33,500.

- 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. Amount \$393,000.
- 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. Amount \$600,000.
- 2004 - 2009 **Sequestration of Carbon Dioxide in Appalachian Coal Deposits**, Co-Principal Investigator, Funded by U.S. Department of Energy through Montana State University. Amount \$500,000.
- 2008 - 2010 **Estimating Natural Fracture Network Patterns in Gas Shales & Tight Sands**, Principal Investigator, Funded by U.S. Department of Energy. Amount \$381,287.
- 2008 - 2010 **Best Practices Analysis in New Albany Shale**, Co-Principal Investigator, Funded by Research Partnership to Secure Energy for America (RPSEA). Amount \$253,060.
- 2009 - 2012 **In-Situ MVA of CO<sub>2</sub> Sequestration Using Smart Field Technology**, Principal Investigator, Funded by United States Department of Energy. Amount \$1,700,000.
- 2010 - 2012 **The Otway CO<sub>2</sub> Sequestration Project**, Principal Investigator, Funded by United States Department of Energy, National Energy Technology Laboratory. Amount \$381,000.

## INSTRUCTIONAL TEACHING GRANTS

- 1996 Recipient of **Microsoft Instructional Lab Grant**. Amount \$70,800.
- 1997 Recipient of **Microsoft Instructional Lab Grant**. Amount \$70,800.
- 1998 Securing Petroleum WorkBench software for the department. Amount \$210,000
- 1999 Recipient of **Microsoft Instructional Lab Grant**. Amount \$70,800.
- 2000 Secured Ten Licenses of **FracPro, PT** (a 3-D hydraulic fracturing simulator) for the department. Amount \$200,000.

## PUBLICATIONS

### A. Refereed/Peer Reviewed Journal Articles

Using Artificial Neural Networks to Generate Synthetic Well Logs. *Journal of Natural Gas Science and Engineering*, August 2009, [doi:10.1016/j.jngse.2009.08.003](https://doi.org/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, Holland.

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. Book Chapters**

**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. Nikraves, 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. Nikraves, 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. Nikraves

**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 Raj, 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, **5<sup>th</sup> 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**

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**

### **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”, *Eighth 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”, *Eighth 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 Mohaghegh, 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 Madabhusi, 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, 9<sup>th</sup> 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

**Chicontepec Asset Team, Pemex.** Poza Rica, Mexico. September 14, 2009. Title: Production Optimization from Mature Fields.

**National Energy Technology Laboratory, U.S. Department of Energy.** Morgantown, WV. July 14, 2009. Title: Surrogate Reservoir Models.

**AAPG 2009 Annual Convention and Exhibition.** Denver, Colorado. June 10, 2009. Title: Top-Down, Intelligent Reservoir Modeling.

**EnCana.** Denver, Colorado. June 9, 2009. Title: Recent Advances in Reservoir Simulation and Modeling using State-of-the-art Artificial intelligence & Data Mining.

**Shell Exploration & Production.** Denver, Colorado. June 8, 2009. Title: Production Optimization in Tight Gas Formations via Restimulation using State-of-the-art Artificial intelligence & Data Mining.

**SPE Forum on Artificial Intelligence in Exploration and Production Industry.** Colorado Springs, Colorado. June 3, 2009. Title: Top-Down, Intelligent Reservoir Modeling.

**West Virginia Geological and Economic Survey (WVGES).** Morgantown, West Virginia. March 2, 2009. Title: Top-Down, Data Driven Reservoir Modeling.

**National Energy Technology Laboratory, U.S. Department of Energy.** Morgantown, WV. February 25, 2009. Title: Top-Down, Intelligent Reservoir Modeling.

**University of Pennsylvania, Robert A. Fox Leadership Program.** Philadelphia, Pennsylvania. November 28, 2008. Title: Acceptance of new Technology in the Energy Industry, Example of Artificial Intelligence.

**BP Office.** Houston, Texas. October 15, 2008. Title: More than 15 years of Applied Data Analytics in the E&P Industry.

**Engineers and Professionals at US Department of Energy & Brazil (via Live Satellite Video).** Morgantown, WV and Via Satellite to Rio de Janeiro Brazil, August 12, 2008. Title: Reservoir Engineering Aspects of Coalbed Methane Production.

**PEMEX, Cantarell Asset.** Ciudad Del Carmen, Mexico. August 8, 2008. Title: Surrogate Reservoir Models and Top-Down Full Field Reservoir Modeling - New Advances in reservoir Modeling.

**SPE Local Chapter, Great Yarmouth Petroleum Section.** Great Yarmouth, England, U.K. May 29, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, London Section.** London, England, U.K. May 27, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**RasGas.** Doha, Qatar. May 4, 2008. Title: Application of Artificial Intelligence & Data Mining (AI&DM) in Petroleum Industry.

**SPE Local Chapter, Kazakhstan Section.** Atyrau, Kazakhstan. April 23, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Pakistan Section.** Islamabad, Pakistan. April 21, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Republic of Yemen Section.** Sana'a, Yemen. April 19, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Egyptian Section.** Cairo, Egypt. April 16, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Congo Section.** Pointe-Noire, Congo. February 13, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Angola Section.** Luanda, Angola. February 12, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Southern African Section.** Cape Town, South Africa. February 11, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Gabon Section.** Port Gentil, Gabon. February 7, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, North-Eastern North America Section.** Morgantown, WV. January 16, 2008. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Eastern Venezuela Section.** Porta La Cruz, Venezuela. December 11, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Macae Section.** Macae, Brazil. December 7, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Rio de Janeiro Section.** Rio de Janeiro, Brazil. December 6, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Argentine Petroleum Section.** Buenos Aires, Argentina. December 5, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Golfo San Jorge Section.** Comodoro Ravidavia, Argentina. December 3, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Mexico City Section.** Mexico City, Mexico. October 11, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart

Fields, Challenges & Potential Solutions.

**University Nacional Autonomous Mexico UNAM, Mexico City.** Mexico City, Mexico. October 11, 2007. Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Bartlesville Section.** Bartlesville, Oklahoma. October 10, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, New Orleans Section.** New Orleans, Louisiana. October 9, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Volga Section.** Almetyevsk, Republic of Tatarstan, Russia. September 17, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Western Siberia Section.** Noyabrsk, Russia. September 14, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Moscow Section.** Moscow, Russia. September 13, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Nizhnevartovsk Section.** Nizhnevartovsk, Russia. September 12, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Local Chapter, Tomsk Section.** Tomsk, Russia. September 10, 2007. (SPE Distinguished Lecture Series). Title: Smart Completions, Smart Wells and Now Smart Fields, Challenges & Potential Solutions.

**SPE Symposium, Dhahran, Saudi Arabia.** Dhahran, Saudi Arabia. April, 2007. Title: Smart Fields, Application of Surrogate Reservoir Models.

**SPE Symposium, Dhahran, Saudi Arabia.** Dhahran, Saudi Arabia. April, 2007. Title: Application of Surrogate Reservoir Models at Grid Block Level to 4D Seismic Interpretation.

**Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC).** Abu Dhabi, U.A.E. November 4, 2006 – Panelist. Title: Surrogate Reservoir Models for Fast Track Reservoir Analysis.

**Petroleos Mexicanos (PEMEX) Office – Cantarell Field.** Ciudad de Carmen, Mexico, September 18, 2006. Title: Intelligent Surrogate Models for Real-Time Optimization.

**Shell Exploration & Production Company.** Houston, Texas. March 2, 2006. Title: Intelligent Production Data Analysis.

**SPE/EAGE Reservoir Characterization and Simulation Symposium.** Dubai, United Arab Emirates, December 11, 2005. Title: Development of Surrogate Reservoir Models (SRMs) for Fast Track Analysis of Complex Reservoirs.

**SPE Applied Technology Workshop on Refracturing of Tight Formations.** San Antonio,

Texas, December 6, 2005. Title: Intelligent Candidate Selection for Restimulation of Tight Gas Wells.

**Zakum Development Company - ZADCO.** Abu Dhabi, United Arab Emirates, May 4, 2005. Title: Intelligent Reservoir Models (SRMs) and their application in Smart Fields.

**Society of Petroleum Engineers, San Joaquin Valley Section.** Bakersfield, California, April 12, 2005. Title: Increasing Oil Field Productivity with the Aid of Artificial Intelligence.

**Society of Petroleum Engineers, Coastal Section.** Ventura, California, April 13, 2005. Title: Increasing Oil Field Productivity with the Aid of Artificial Intelligence.

**Abu Dhabi Company for Onshore Oil Operations, ADCO – NEB Asset Team.** Abu Dhabi, United Arab Emirates, January 4, 2005. Title: Intelligent Reservoir Models (SRMs) and their application in Smart Fields.

**Abu Dhabi International Petroleum Exhibition & Conference.** Abu Dhabi, United Arab Emirates, October 11, 2004. Title: Smart Fields. Moderator of the Panel.

**DOE Gas Storage Consortium Proposal Evaluation Meeting.** Morgantown, West Virginia. June 9, 2004. Title: Intelligent Candidate Selection for Gas Storage Well Remedial Operation.

**Northern Appalachian Coalbed Methane Consortium, Inaugural Meeting.** Washington, Pennsylvania, April 15, 2004. Title: Latest CBM Research and Development Efforts at WVU.

**U.S. Department of Energy, National Energy and Technology Laboratory.** Morgantown, West Virginia, February 2, 2004. Title: Intelligent Reservoir Characterization

**SPE Forum on Smart Wells, Discussion Leader.** Muscat, Oman, January 15, 2004. Title: How Smart Are the Smart Wells?

**ADCO, Abu Dhabi Company for Onshore Oil Operations.** Abu Dhabi, United Arab Emirates, January 10, 2004. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Saudi Aramco, Formation Evaluation Team.** Dhahran, Saudi Arabia, January 4, 2004. Title: Latest Intelligent Software Developments for the Oil & Gas Industry.

**U.S. Department of Energy, National Energy and Technology Laboratory.** Tulsa, Oklahoma, December 2, 2003. Title: Intelligent Best Practices Analysis, A New and Novel Methodology.

**Newfield Explorations, Inc.** Tulsa, Oklahoma, December 2, 2003. Title: Intelligent Production Data Analysis, A New and Novel Methodology

**Petroleum Technology Transfer Council.** Morgantown, West Virginia, October 9, 2003. Title: Oil and Gas Data Management and Analysis using Intelligent System.

**University of Kansas, Department of Chemical & Petroleum Engineering, Graduate Seminar,** Lawrence, Kansas, November 4, 2003. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Society of Petroleum Engineers, Applied Technology Workshop on Virtual Intelligence,**

Panelist, Special session on the Future of VI in Petroleum Engineering. Houston, Texas, February 25, 2003. Title: Future Of Virtual Intelligence in Petroleum Engineering.

**Society of Petroleum Engineers, Applied Technology Workshop on Virtual Intelligence**, Houston, Texas, February 24, 2003. Title: Applied Virtual Intelligence in Petroleum & Natural Gas Engineering.

**Society of Petroleum Engineers, 2002 Annual Conference & Exhibition**, Panelist in Artificial intelligence special session. San Antonio, Texas, October 1, 2002. Title: Applied Virtual Intelligence in Petroleum & Natural Gas Engineering.

**BP - MCPU/Anadarko Asset**. Amarillo, Texas, December 2002. Title: Restimulation Candidate Selection, Granite Wash Formation.

**Department of Industrial and Management Systems Engineering, Graduate Seminar**, West Virginia University, Morgantown, West Virginia, September, 2002. Title: Virtual Intelligence Applications in Environmental Engineering.

**INTEVEP – PDVSA (Research Institute of Venezuelan National Petroleum Company)**, Caracas, Venezuela, March 24, 2002. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Oklahoma Independent Petroleum Association**, Oklahoma City, Oklahoma, Sept. 24, 2001. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Society of Petroleum Engineers, North American Forum Series on Real Time Production Optimization**, Park City, Utah, August 1, 2001. Title: Production Optimization Using Neural networks and Genetic Algorithms.

**Society of Petroleum Engineers, Alabama Section**, Birmingham, Alabama, March 14, 2001. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Department of Civil and Environmental, Graduate Seminar**, Morgantown, West Virginia, February 21, 2001. Title: Virtual Intelligence Applications in Environmental Engineering.

**Society of Petroleum Engineers, Pittsburgh Section**, Pittsburgh, PA, November 14, 2000. Title: Virtual Intelligence Applications in Petroleum Engineering.

**Gas Technology Institute Gas Storage Steering Committee Meeting**, Houston, Texas, October 13, 2000. Title: Restimulation Candidate Selection using Virtual Intelligence Techniques.

**Halliburton, Energy Services**, Houston, Texas, March 13, 2000. Title: Virtual Intelligence and Hydraulic Fracturing, Past Present and Future.

**West Virginia TRAC Conference**, Cedar Lake Conference Center, Ripley, West Virginia, November 15, 1999. Title: CEMR's Virtual classroom on the Internet.

**Technology in Education Graduate Seminar**, Morgantown, West Virginia, November 16, 1999. Title: CEMR's Virtual classroom on the Internet, Bringing the E-Commerce Technology to the Educational Arena.

**West Virginia Information Technology Conference**. Charleston, West Virginia, June 29, 1999. Title: WVU's Virtual Classroom on the Internet: Bringing E-commerce Technology into the Educational Arena.

**Business Solutions Incorporated.** Houston, Texas. April 20, 1999. Title: Virtual Intelligence What Can It do for Business today.

**American Gas Association - Underground Gas Storage Committee Meeting.** Orlando, Florida. March 8, 1999. Title: Virtual Intelligence and Its Applications in Petroleum & Natural Gas Engineering.

**BISC (Berkeley's Initiative on Soft Computing) Special Interest Group in Earth Sciences Workshop,** Lawrence Berkeley National Laboratory, Berkeley, California, March 4, 1998. Title: Virtual Intelligence in Petroleum Engineering, Applications in Hydraulic Fracturing.

**West Virginia University Chair Development Series,** Morgantown, West Virginia. March 17, 1998. Title: Introducing Instructional computing to our Department Chairs.

**CEMR's Executive Committee Meeting,** Morgantown, West Virginia. July 28, 1998. Title: CEMR's Virtual classroom on the Internet.

**Enron Oil and Gas Company,** Denver, Colorado, Enron Head Quarters. August 17, 1998. Title: Virtual Intelligence in Petroleum Engineering, Applications in Hydraulic Fracturing.

**Gas Research Institute,** Chicago, Ill. September 11, 1998. Title: Virtual Intelligence and Its Applications in Petroleum & Natural Gas Engineering.

**Union Pacific Resources,** Fort Worth, Texas, UPR Head Quarters, December 15, 1997. Title: Virtual Intelligence in Petroleum Engineering, Applications in Hydraulic Fracturing.

**Gas Research Institute,** Chicago, Ill. October 20, 1997. Title: Using Virtual Intelligence as a Tool for Well Restimulation Candidate Selection and Design.

**Chevron,** Research Center at La Habra, California. July 8, 1997. Title: Virtual Intelligence In Petroleum Engineering.

**Society of Petroleum Engineers Stimulation and Storage Group Winter Meeting,** Pittsburgh, PA. Feb 21 and 22, 1996. Title: Doing More with Less in Stimulation of Clinton Gas Storage Wells.

**Department of Safety and Environmental Management, Graduate Seminar.** West Virginia University, Morgantown, West Virginia. January 20, 1995. Title: Principals of Neural Networks.

**Departmental Seminar, Department of Mining Engineering, Graduate Seminar.** West Virginia University, Morgantown, West Virginia. February 10, 1995. Title: Using Computational Intelligence to Solve Engineering Problems.

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

**Department of Petroleum & Natural Gas Engineering, Graduate Seminar.** New Mexico Institute of Mining and Technology. Socorro, New Mexico. November 13, 1995. Title: Neural Networks; What It Can Do for Petroleum Engineers.

**Society of Petroleum Engineers Computer Users Group,** Midland, Texas. Nov. 14, 1995. Title: Neural Networks; What It Can Do for Petroleum Engineers.

**Department of Petroleum & Natural Gas Engineering, Graduate Seminar.** The

Pennsylvania State University, University Park, PA. September 14, 1995. Title: Neural Networks Applications in Petroleum Engineering.

**Society of Petroleum Engineers, Northern West Virginia Section**, Clarksburg, West Virginia. Feb. 10, 1995. Title: Neural Networks Applications in Petroleum Engineering.

## **SHORT COURSES TAUGHT TO THE INDUSTRY**

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

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

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

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

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

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

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

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.

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.

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.

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.

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),**

Duration: Three Days Short Course. Location: Rio de Janeiro, Brazil. Date: September 21-23, 2009.

Duration: One Day Short Course. Location: Tehran, Iran. Date: November 25, 2007

Duration: Three Days Short Course. Location: Sheraton, Abu Dhabi, U.A.E. Date: May 11-13, 2007

Duration: Two Days Short Course. (In conjunction with SPE ATCE 2007). Location: Anaheim Convention Center, Anaheim, CA. Date: November 11-12, 2007

Duration: Two Days Short Course. Location: Denver, Colorado. Date: February 25-26, 2008

Duration: Four Days Short Course – In-House, PEMEX. Location: Villahermosa, Tabasco, Mexico. Date: July 21-24, 2008

Duration: Two Days Short Course. (In conjunction with SPE ATCE 2008). Location: Denver, Colorado. Date: September 21-22, 2008

### **Coalbed Methane Reservoir Engineering,**

Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2001

Duration: One Day Short Course. Location: Coalbed Methane Forum, Morgantown, West Virginia. Date: October 2001

Duration: Two and a Half Days Short Course. Location: Tulsa, Oklahoma. Date: May 2002

Duration: Two Days Short Course. Location: Devon Energy Corporation, Oklahoma City, Oklahoma. Date: May 2002

Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2002

Duration: One Day Short Course. Location: Coalbed Methane Forum, Morgantown, West Virginia. Date: October 2002

Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: August 2003

Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: February 2004

Duration: Two and a Half Days Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: February 2005

Duration: One Day Short Course. Location: West Virginia University, Morgantown, West Virginia. Date: October 2005

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.

1/88-8/91 **THE PENNSYLVANIA STATE UNIVERSITY**

Research Assistant: Member of a team investigating new strategies for in-situ characterization of coal seam, DOE contract #DE-FG22-87PC79927

Teaching Assistant: Coordinating as well as teaching production engineering laboratory. Assisting the professor for Numerical Solution of the Partial Differential Equations of Flow in Porous Media and Reservoir Modeling.

1/87-12/87 **TEXAS A & I UNIVERSITY**

Research Assistant: Actively participating in Reservoir Engineering study of Aqua Dulce field in South Texas.

Teaching Assistant: Teaching Calculus, Drilling Engineering & Chemistry Laboratories.

## 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

## CONSULTING

### **Provided professional consulting services to:**

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  
Saudi Aramco

## HONORS/ PROFESSIONAL MEMBERSHIPS/ ACTIVITIES

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.

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.

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

Member of SPE Continuing Education Committee, 2005- Present.

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

Member of **IEEE**, Institute of Electrical and Electronic Engineers, since 1993.

Member of **INNS**, International Neural Network Society, since 1993.

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.