Ilham El-Monier, Ph.D.

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Education and Academic Experience

Associate Professor of Practice/Research Associate Professor, William G. Lowrie Department of Chemical & Biomolecular Engineering, Ohio State University.	Since August 2022
Assistant Professor of Practice, William G. Lowrie Department of Chemical & Biomolecular Engineering, Ohio State University.	8/2016 – August 2022
Lecturer and Post-Doctoral fellow, the Mewbourne School of Petroleum and Geological Engineering, The University of Oklahoma.	2/2013- 8/2016
Ph.D. in Petroleum Engineering, Texas A&M University in College Station. Dissertation: Fines migration and clay stabilization.	October 2012
M.Sc. in Petroleum Engineering, The University of Cairo Dissertation: A comparative study and modeling of the common water drive calculation methods in the oil and gas reservoir.	May 2007
B.Sc. in Petroleum Engineering, The University of Cairo. Dissertation: Evaluation of one of the oil reservoirs in EGYPT.	May 2004

Professional Academic Work Experience

- Assistant Professor of Practice, William G. Lowrie Department of Chemical & Biomolecular Engineering, Ohio State University (8/2016 – Present). Leading the development of the Petroleum Engineering Minor program.
- Lecturer and Post-Doctoral fellow at the Mewbourne School of Petroleum and Geological Engineering, The University of Oklahoma (2/2013 – 7/2016).
- Teaching Assistant at Texas A&M University for the graduate/undergraduate level (2010-2012).
- Teaching Assistant at the University of Cairo for the undergraduate level (2004-2007).

Courses Taught

- Thermodynamics.
- Introduction to Petroleum Engineering.
- Reservoir Engineering.

- Production and Drilling Engineering.
- Petrophysics lab.
- Fluid Mechanics lab.
- Numerical Simulation.

Industry Experience/Reservoir Engineering/Simulation Experience

- BP Co. (British Petroleum), Cairo's office.
- Training in SUCO, Rashid, GUPCO "Office & Gas Plant (Dahshour Field)," Ageeba, and Petrobel (Field visit) in Egypt.

Job Duties:

✓ Reservoir Engineer:

- Calculating the reserve and OOIP for some of the reservoirs and wells in Razzaq Field,
- Evaluating geological maps for determining areas of interest,
- Analyzing the pressure transient tests such as drawdown and build up tests,
- Estimating the average reservoir pressure and permeability, and types of flow,
- Assessing the reservoirs under water drive mechanism and others under water flooding,
- Evaluating the logs for estimating the productive intervals and determining water, oil and gas zones,
- Working on MBAL software for production matching and forecast, production optimization, and for decline and type curves analysis.
- Excellent experience in using Fortran, Visual Basic, MBAL, Eclipse, CMG, KAPPA (Ecrin), Fekete software, Mangrove for fracture/horizontal well modeling (I was able to get a donated license for Mangrove from Schlumberger). Participated in the PIPESIM training hosted by Schlumberger Co. at Texas A&M University.

Lab Work Experience

It was an honor to join some of the State of Arts laboratories in the USA, in Texas A&M University and in The University of Oklahoma, where I had very good opportunities to work on some of their equipment during the past seven years such as:

- Core analysis, rheological methods, and rock and fluid properties using Densimeter, Caliper, Bead pack experiment, Sieve Analysis, porosimeter, coreflood, capillary viscometer for rheology, Tensometer, and Dean Stark method. This variety of equipment was used for the clay stabilizers/polymer fluids' and rocks/fluids' characterization.
- High-pressure/high-temperature coreflood setup to investigate the damage caused by fines migration, and assess the permeability reduction or enhancement after the treatments. I also used Inductive Coupled Plasma Spectroscopy (ICP_OES), Zeta Potential, and Microscope for analyzing the core effluent samples.
- Resistivity and sound wave instruments (NER Autolab 1500), Nuclear magnetic resonance (NMR), Fourier transform infrared spectroscopy (FTIR), and capillary pressure instrument (MICP).
- Geo-mechanical characterization, stress-strain analysis.
- Image Analysis using ImageJ, Ion Milling, and SEM for fractured rocks in shales/sands.

Research Interests

- Hydrogen production and CO_2 in-situ sequestration.

- Machine learning and data mining application in the oil and gas industry.
- Fluid mechanics and petrophysics in conventional and unconventional reservoirs.
- Hydraulic fracturing and mechanical properties.
- Fracturing and image analysis of hydraulic fractures and micro-cracks in sandstone, carbonate, and shale rocks.
- Formation damage and its effect on the reservoir mechanical properties in conventional and unconventional reservoirs.
- Reservoir engineering and reservoir characterization.
- Enhanced oil recovery.
- Well-test analysis, decline and type curve analysis, history matching, and production forecast.

Collaboration

I have collaborated with the Earth Sciences department and worked with them on a project related to Utica shale. I joined the faculty advisory board of the Center for Energy Research, Training, and Innovation (CERTAIN) at OSU, from which I received an $18,000.00 fellowship. I also joined the Sustainability Institute as a faculty affiliate.

On the other hand, I am collaborating with Ascent Resources, Halliburton, Schlumberger, NSI Technologies, and other companies to arrange field trips, software training, and job recruiting. I planned several field trips and secured commercial software (Two GOHFER licenses from Halliburton and several commercial software packages from Schlumberger, 60 license/software.)

Scholar and Research

During the last five years, I published four journal papers and five conference papers. I graduated one Ph.D. student and one Master's student, in addition to serving as a committee member of several Master's and Ph.D. students in the CBE and E.Sc. departments.

Additionally, I got invited as a guest speaker to the Annual Meeting of the Ohio Oil and Gas Association dinner to broaden and deepen connections to Ohio State concerning oil and gas activities and the Minor program. These communications lead to more advertisements for the Petroleum Minor program and help communicate with the industry to bring more recruiters to the Petroleum Minor undergraduate and graduate students.

Furthermore, I am a Reviewer at the Annual In-State Competitive Research Grants Program at the Ohio Water Resources Center and Office of Energy and Environment at OSU, and a Reviewer for the International Journal of Oil, Gas, and Coal Technology (IJOGCT.) Besides, I am an Editor for the Journal of Petroleum Engineering & Technology.

Honors/Grants

- Received $50,000 as a donation to build a coreflood lab for undergrad and research.
- Received $2000.00 grant from CERTAIN (Center for Energy Research, Training, and Innovation at OSU).
- Collaborated with the School of Earth Sciences at OSU for a DOE proposal of $32.0 MM, declined.

- Fund proposal for $60,000.00 to the Battelle Engineering, Technology, and Human Affairs (BETHA) Endowment, which supports programs that examine the impact of science and technology on people and society, declined.
- Secured $5400.00 fund for SPE student chapter at OSU from CERTAIN (2019).
- Secured $6500.00 fund for SPE student chapter at OSU from CERTAIN and from an OSU Alum (2017).
- Received SERC Fellow Grant for $15,000.00 (2017).
- Received a Travel Grant for $2000.00 from SPE (2014).
- Awarded by Schlumberger Foundation Scholarship for 4 years (Academic years) to Texas A&M Univ. for the Ph.D. program (2007-2011) as one of the female role models.
- Awarded by Cairo University for the second rank in the petroleum department (2004).
- Awarded by Schlumberger Petroleum Co. for being one of the promising students (2003).

Professional Activities and Mentoring

- Committee member of Master and Ph.D. students.
- OSU Sustainability Institute faculty affiliates, current.
- CERTAIN (Center for Energy Research, Training, and Innovation at OSU) faculty advisory committee member, current.
- Student paper contest chair: the organizer of the 2017 regional Student Paper Contest hosted by OSU (2017.)
- Petroleum Engineering Minor committee chair (Since 2016.)
- Developed Petroleum Engineering Minor program at OSU, including visits to Halliburton facility and Ascent Resources rig site to maintain industry relationships. Developed Introduction to Petroleum Engineering, Reservoir Engineering, and Drilling and Production Engineering Undergraduate Petroleum courses (2016 – Present.)
- Academic Advisor for SPE student chapter at OSU (2016 – Present.)
- Editor for the Journal of Petroleum Engineering & Technology (Since 2013.)
- Reviewer for the International Journal of Oil, Gas and Coal Technology (Since 2014.)
- Researcher in Risk Assessment Activities within the framework of the European Tempus Risk Project JEP30095/2002 with Dr. Fouad Khalaf, Professor at Cairo University (2004-2007.)
- Assisted in coordinating and organizing several conferences related to the Risk Assessment project (2004-2007.)
- Assisted in organizing the 9th Conference of Mining, Petroleum, and Metallurgical Engineering at Cairo University, Egypt (2006.)
- Researcher on ArcGIS "Natural Risk" at the University of Firenze in Florence (Italy) within the framework of the European Tempus Risk Project JEP30095/2002 (June 2005-August 2005.)

Academic Service Experience

- Traveled to SPE-ATCE 2022 to network with oil and gas companies for awareness event plans.
- Led activities in elementary school for multicultural and diversity, 2019.
- Diversity and inclusion committee member at OSU, since 2019.
- Petroleum Engineering Minor committee chair, since 2016.

- Developed Petroleum Engineering Minor program at OSU, including visits to Halliburton facility and Ascent Resources rig site to maintain industry relationships. Developed Introduction to Petroleum Engineering, Reservoir Engineering, and Drilling and Production Engineering Undergraduate Petroleum courses (2016 – Present.)
- Chair: advised two Ph.D. students.
- Chair: advised two Master students.
- Academic advisory committee member for undergraduate students (2014-2016.)
- ABET accreditation preparations and activities committee member (2013-2016.)
- Website committee member (2014-2016.)

Leadership/Teaching Workshops

Attended the SPE-ATCE, Houston, TX, in 2022.

Attended the Women's Global Leadership Conference in Energy in Houston, TX, in 2019.

Attended ASEE Summer School for Chemical Engineering Faculty at North Carolina State University and presented a poster in 2017.

Attended a Professionalism workshop organized by OU in 2015.

Attended Foundations for Effective Leadership (FEL) workshop organized by OU in 2014.

Attended Effective Writing for Student Learning Workshop organized by OU in 2014.

Attended the What the Best Teacher Do workshop organized by OU in 2014.

Attended the Coaching for Performance workshop organized by OU in 2014.

Attended Foundations in Management (FIM) workshop organized by OU in 2014.

Attended Navigating Conflict to Obtain Positive Outcomes workshop organized by OU in 2014.

Professional Societies Membership

- REACH for Commercialization, Inspiring Female Entrepreneurship at Ohio State and Beyond, current cohort member, 2019.
- Society of Petroleum Engineering (SPE) since January 2003.
- Women in Energy (WIN) since 2014.
- Young Exploration Production and Professional (YEEP) Section, "Young Board" of the SPE.

OSU Teaching Experience

- At Ohio State University, I developed petroleum courses from scratch to meet the diverse group's needs. As a result, I am teaching different majors, such as Chemical Engineering, Mechanical Engineering, Civil Engineering, and Earth Sciences. I have developed three courses: Introduction to Petroleum Engineering, Reservoir Engineering, and Production and Drilling Engineering. I also helped develop the fourth course, Project Evaluation, taught by Paul Dubetz. I am also teaching Thermodynamics to Chemical Engineering students. These experiences gave me substantial skills in

dealing with students from diverse backgrounds and cultures. Moreover, I am in the process of taking the program to the next level by building a coreflood lab that will serve our students and open research opportunities.

Lecturer Position Responsibilities (University of Oklahoma)

Lecturer for Reservoir Fluid Mechanics and Reservoir Rock Properties at The University of Oklahoma, Petroleum Department for junior and senior level. I helped in developing and adding new experiments to the undergrad lab. My primary responsibilities were:

- Instructing the Reservoir Rock Properties lab, including seven sections with 210 students in total. Each week I give a lecture on lab instructions and methodology. I was responsible for setting up experiments, explaining the procedures to undergraduate students, and evaluating their technical reports. I also directed the seven TAs assigned to the course. Some of the experiments that I have been teaching are:
    1. Laboratory measurements, statistics, errors
    2. Core recovery, marking, sampling, and preparation
    3. Laboratory reports and citation style; Introduction to Excel, special function keys
    4. Grain size analysis
    5. FTIR mineralogy, density and porosity, permeability and dependence on pressure
    6. Acoustic velocity measurement and dependence on pressure
    7. NMR porosity, bound and free water
    8. Resistivity and dependence on pressure
    9. Mechanical properties
    10. Thin Section

- Instructing the Petroleum Engineering Reservoir Mechanics lab, including five sections with 130 students. Each week, I gave the lecture for lab instructions and methodology, and attended the laboratory sessions providing leadership and directions. I was responsible for setting up experiments, explaining the procedures to students, and evaluating their technical reports. Besides, I supervised the five TAs assigned to the course. Some of the experiments that I have been teaching are:
    1. Introduction and lab safety
    2. API gravity and viscosity measurements
    3. Core data analysis
    4. Reservoir volumetric analysis
    5. PVT analysis, Interfacial tension, and contact angle
    6. Capillary pressure and NMR
    7. Water flooding; WAG flooding; surfactant flooding
    8. Steady/Unsteady state relative permeability
    9. Asphaltene precipitation

Recent Publications

- El-Monier. I. 2022. Insights on Formation Damage Associated with Hydraulic Fracturing using Image Analysis and Machine Learning. *The Canadian Journal of Chemical Engineering (CJCE.)* ISSN: 00084034-1939019X. https://doi.org/10.1002/cjce.24380

- Gong, Y., El-Monier, I, and Mehana, M. **2021**. Revealing the Effect of Bifurcated Fractures and Fluid Parameters during Multiphase Slurry Transport. *Energy Fuels*, 35, 13, 10519–10528. https://doi.org/10.1021/acs.energyfuels.1c00753

- Gong,Y., Mehana, M., El-Monier, I., and Viswanathan, H. **2020**. Proppant Placement in Complex Fracture Geometries: A Computational Fluid Dynamics Study. *Journal of Natural Gas Science & Engineering*. Vol. 79.
- Gong,Y. and El-Monier, I. **2019**. Microstructure diagnosis of the fractured tight sandstone using image analysis. *Journal of Petroleum Science and Engineering*, Vol. 183. https://doi.org/10.1016/j.petrol.2019.106449
- Gong,Y., Mehana, M., Xiong, F., Xu, F., and El-Monier, I. **2019**. Towards Better Estimations of Rock Mechanical Properties Integrating Machine Learning Techniques for Application to Hydraulic Fracturing (SPE 195884-MS). in the SPE Annual Technical Conference and Exhibition, Calgary, Alberta, Canada.
- Gong,Y., Mehana, M., El-Monier, I., Xu, F., and Xiong, F. **2019**. "Machine Learning for Estimating Rock Mechanical Properties beyond Traditional Considerations got accepted and will be published and presented at the Unconventional Resources Technology Conference in Denver, CO July 22-24, 2019. DOI: 10.105530/urtec-2019-897
- Gong,Y., El-Monier, I. **2018**. Quantification of Fracture Surface Roughness and its Insights to Mechanical Rock Properties Determination Using Image Analysis Techniques (SPE-191824-18ERM-MS). SPE/AAPG Eastern Regional Meeting 2018, Pittsburgh, Pennsylvania.
- Gong,Y., El-Monier, I. **2018**. Quantification of Fracture Surface Roughness and Its Insights to Mechanical Rock Properties Determination Using Image Analysis Techniques (SPE-193134-MS). Abu Dhabi International Petroleum Exhibition & Conference (ADIPEC.) Society of Petroleum Engineers, Abu Dhabi, UAE
- Gong,Y., El-Monier, I. Shi X. **2018**. The Evolution of Proppant Distribution in a Multiscale Fracture Processed Zone, The Geological Society of America 130th Annual Meeting 2018, Indianapolis, Indiana. DOI: 10.1130/abs/2018AM-319055
- El-Monier, I. **2016**. Evaluation of Rock Damage and Fracture Propagation on MicroCracks Development and Stimulation Quality of Tight Formations: Quantitative and Statistical Characterization. URTEC-2460196-MS at the 2016 Unconventional Resources Technology Conference (URTeC) in San Antonio, Texas, 1- 3 August.
- Mehana, M. and El-Monier, I. **2016**. Nuclear Magnetic Resonance (NMR) and Fluid Typing in Unconventional reservoirs. In Preparation for Publication in the Petroleum Journal.
- Mehana, M. and El-Monier, I. **2016**. Comparative Study for Nuclear Magnetic Resonance (NMR) Fluid Typing Methods and the Correlations Used for Properties Estimation in Shale. Poster Presentation in Preparation for the AAPG Annual Convention & Exhibition (ACE), Calgary, Alberta, Canada.
- Mehana, M. and El-Monier, I. **2016**. Parametric study for the optimization of Water Alternating Gas (WAG) technique. Presentation in Preparation for publication in the *1st International Geomechanics Forum.*
- Mehana, M. and El-Monier, I. **2015**. Numerical Investigation of the Osmotic Flow Impact on the load Recovery and Early Well Performance. *Journal of Petroleum Engineering and Technology* **5**(3): 52-64.
- El-Monier, I.A. and H.A. Nasr-El-Din. **2015**. Mud Acid Effect on Fines Migration Problem Using a Newly Developed AlZr-Based Clay Stabilizer (A) Mitigation Can Happen. *Journal of Petroleum Engineering and Technology* **5**(3): 11-29.

- El-Monier, I.A. and Nasr El-Din, H.A. **2013**. A New Environmentally Friendly Clay Stabilizer. *SPE Prod & Oper* **28** (2): 145-153. SPE-136061-PA.
- El-Monier, I.A. and Nasr El-Din, H.A. 2013. A Study of Environmentally Friendly Clay Stabilizers. CETI-12-048, *Canadian Energy Technology & Innovation Journal*.
- El-Monier, I.A., and H.A. Nasr-El-Din. **2013**. A New Al-Based Stabilizer for High PH Applications. *J. Energy Resour. Technol*. **135**(2), 022903-1: 022903-7.
- El-Monier, I.A. and Nasr El-Din, H.A. **2011**. A Study of Several Environmentally Friendly Clay Stabilizers. Paper SPE 142755 presented at the SPE Project and Facilities Challenges Conference at METS held Doha, Qatar. 13-16 February.