

# Hamid Emami-Meybodi

Program Chair and Associate Professor, Petroleum and Natural Gas Eng.

Director, Subsurface Energy Recovery and Storage JIP

Dr. Charles H. Bowman & Lynn A. Holleran Professorship

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## EDUCATION

- 2015 **Ph.D.** in Petroleum Engineering, University of Calgary, Alberta, Canada
- 2011 **M.Sc.** in Petroleum Engineering, University of Calgary, Alberta, Canada
- 2008 **M.Eng.** in Reservoir Engineering, University of Calgary, Alberta, Canada
- 2007 **M.Sc.** in Chemical Engineering, Petroleum University of Technology, Tehran, Iran
- 2005 **B.Sc.** in Petroleum Engineering, Petroleum University of Technology, Ahwaz, Iran

## PROFESSIONAL AND ACADEMIC APPOINTMENTS

- 08/2023 – present **Program Chair, Petroleum and Natural Gas Engineering**  
Department of Energy and Mineral Engineering, Penn State University, USA
- 07/2021 – present **Associate Professor**  
Department of Energy and Mineral Engineering, Penn State University, USA
- 10/2015 – 06/2021 **Assistant Professor**  
Department of Energy and Mineral Engineering, Penn State University, USA
- 06/2015 – 09/2015 **Postdoctoral Fellow**  
Department of Geoscience, University of Calgary, Canada
- 09/2009 – 04/2015 **Research Assistant**  
Dept. of Chemical & Petroleum Eng., University of Calgary, Canada
- 08/2014 – 01/2015 **Visiting Research Fellow**  
CSIRO, Melbourne, VIC, Australia
- 08/2013 – 12/2013 **Reserves Evaluation Engineer**  
Ryder Scott Company, Calgary, Canada
- 09/2008 – 08/2009 **Research Assistant**  
PTRC, University of Regina, Canada
- 05/2007 – 06/2008 **Instructor**  
National Iranian Gas Company, Esfahan, Iran
- 01/2007 – 08/2008 **Research Assistant**  
PUT Research Centre, Tehran, Iran

## EXPERTISE

- Multiphase flow and transport phenomena in porous media
- Carbon dioxide and hydrogen storage in geological formations
- Unconventional reservoir production analysis and hydrocarbon recovery
- Mathematical modeling and numerical simulations

## PUBLICATIONS

### Peer-reviewed Journals

1. K. Babatunde, H. **Emami-Meybodi** (2024) Species-based modeling of binary gas mixture transport in nanoporous media with adsorption, *Energy Fuels*, *accepted*
2. M. Ma, Y. Shakeel, K. Babatunde, H. **Emami-Meybodi** (2024) Modeling of adsorption-controlled binary gas transport in ultratight reservoirs, *Geoenergy Science and Engineering*, *accepted*
3. M. Ma, H. **Emami-Meybodi**, F. Zhang, Z. Rui (2024) Mass transport modelling of two partially miscible, multicomponent fluids in nanoporous media, *J. Fluid Mech.* doi:10.1017/jfm.2024.431
4. H. **Emami-Meybodi**, M. Ma, F. Zhang, Z. Rui, A. Rezaeyan, A. Ghanizadeh, H. Hamdi, C. R. Clarkson (2024) Cyclic gas injection in low-permeability oil reservoirs: progress in modeling and experiments, *SPE J.*, SPE-223116-PA, 1-34.
5. F. Zhang, Y. Pan, C. Liu, C.-H. Yang, H. **Emami-Meybodi**, Z. Rui, (2024) A two-phase flowback type curve with fracture damage effects for hydraulically fractured reservoirs, *SPE J.*, 29 (10) 5464-5486.
6. M. Ma, H. **Emami-Meybodi** (2024) Inhomogeneous fluid transport modeling in dual-scale porous media considering fluid-solid interactions, *Langmuir*, 40 (34) 17951-17963.
7. T. Hu, T. Yang, B. Dindoruk, F. Torabi, B. Mcpherson, H. **Emami-Meybodi** (2024) Investigation the impact of methane leakage on the marine carbon sink, *Applied Energy*, 360, 122880.
8. M. Ma, H. **Emami-Meybodi** (2024) Multicomponent inhomogeneous fluid transport in nanoporous media, *Chem. Eng. J.*, 485, 149677.
9. M. Jin, H. **Emami-Meybodi**, M. Ahmadi (2024) Flowing bottomhole pressure during gas lift in unconventional oil wells, *SPE J.*, 29 (05) 2432–2444.
10. M. Ma, H. **Emami-Meybodi** (2024) Multiphase multicomponent transport modeling of cyclic solvent injection in shale reservoirs, *SPE J.*, 29 (03) 1554–1573.
11. Z. Liu and H. **Emami-Meybodi** (2023) Gas transport modeling in organic-rich nanoporous media with nonequilibrium sorption kinetics, *Fuel*, 340, 127520.
12. F. Zhang, L. Zou, Z. Rui, H. **Emami-Meybodi**, L. Ayala, Z. Zhang, (2023) A two-phase type-curve method with multiscale fluid transport mechanisms in hydraulically fractured shale reservoirs, *Petroleum Science*, 20 (4) 2253–2267.
13. Z. Liu and H. **Emami-Meybodi** (2022) Apparent diffusion coefficient for adsorption-controlled gas transport in nanoporous media, *Chem. Eng. J.*, 450 (4) 138105.
14. Z. Liu and H. **Emami-Meybodi** (2022) Continuum-scale gas transport modeling in organic nanoporous media based on pore-scale density distributions, *SPE J.*, 27(06) 3455–3473.
15. F. Zhang and H. **Emami-Meybodi** (2022) A type-curve method for two-phase flowback analysis in hydraulically fractured hydrocarbon reservoirs, *J. Petro. Sci. Eng.*, 209, 109912
16. F. Zhang and H. **Emami-Meybodi** (2022) Semianalytical method of two-phase liquid transport in shale reservoirs and its application in fracture characterization, *AIChE J.*, 68, e17449
17. K. Enab and H. **Emami-Meybodi** (2021) Effects of diffusion, adsorption, and hysteresis on huff-N-puff performance in ultratight reservoirs with different fluid types and injection gases, *Energies*, 14(21), 7379
18. H. **Emami-Meybodi** and F. Zhang (2021) Buoyancy-driven instabilities of partially miscible fluids in inclined porous media, *J. Fluid Mech.*, 926, A32
19. Z. Liu and H. **Emami-Meybodi** (2021) Diffusion-based modeling of gas transport in organic-rich ultratight reservoirs, *SPE J.*, 26(02), 857–882.

20. Z. Liu and H. **Emami-Meybodi** (2021) Rate transient analysis of infinite-acting linear flow by use of piecewise constant diffusivity coefficients, *J. Petro. Sci. Eng.*, 196 (107783).
21. M. Zhang, N. Chakraborty, Z. Karpyn, H. **Emami-Meybodi**, L. Ayala (2021) Experimental and numerical study of gas diffusion and sorption kinetics in ultratight rocks, *Fuel*, 286(119300).
22. F. Zhang and H. **Emami-Meybodi** (2020) A semi-analytical method for two-phase flowback rate transient analysis in shale gas reservoirs, *SPE J.*, 25(04), 1599–1622.
23. Z. Liu and H. **Emami-Meybodi** (2020) A unified approach to the nonlinearity of the diffusivity equation and assessment of pseudo-time, *SPE J.*, 26(01), 241–261.
24. F. Zhang and H. **Emami-Meybodi** (2020) Analysis of early-time production data from multi-fractured shale gas wells by considering multiple transport mechanisms through nanopores, *J. Petro. Sci. Eng.*, (108092).
25. F. Zhang and H. **Emami-Meybodi** (2020) Flowback fracture closure of multi-fractured horizontal wells in shale gas reservoirs, *J. Petro. Sci. Eng.*, 186,106711.
26. M. Cronin, H. **Emami-Meybodi**, R. Johns (2020) Multicomponent diffusion modeling of cyclic solvent injection in ultratight reservoirs, SPE-196008-PA, *SPE J.*, 1–20.
27. F. Zhang and H. **Emami-Meybodi** (2020) Multiphase flowback rate-transient analysis of shale gas reservoirs, *Int. J. Coal Geology*, 217, 103315.
28. M. Cronin, H. **Emami-Meybodi**, R. T. Johns (2019) Unified theory of ultimate hydrocarbon recovery for primary and cyclic injection processes in ultratight reservoirs, *Scientific Reports*, 9:10706, 1–14.
29. S. M. Jafari-Raad, H. **Emami-Meybodi**, H. Hassanzadeh (2019) Impact of boundary excitation on stability of a diffusive boundary layer in porous media, *Adv. Water Resour.*, 126, 40–54.
30. M. Cronin, H. **Emami-Meybodi**, R. T. Johns (2018) Diffusion-dominated proxy model for solvent injection in ultra-tight oil reservoirs, *SPE J.*, 24(02), 660–680.
31. S. Mahmoodpour, B. Rostami, H. **Emami-Meybodi** (2018) Onset of convection controlled by N<sub>2</sub> impurity during CO<sub>2</sub> storage in saline aquifers, *Int. J. Greenh. Gas Con.*, 79, 234–247.
32. F. Zhang and H. **Emami-Meybodi** (2018) Instability of a diffusive boundary layer beneath a capillary transition zone, *Fluids*, 3(4):85,1–11.
33. H. **Emami-Meybodi** (2017) Dispersion-driven instability of mixed convective flow in porous media, *Phys. Fluids*, 29, 094102.
34. M. Singh, M. Zhang, H. **Emami-Meybodi**, L. F. Ayala (2017) Use of rescaled exponential models for boundary-dominated liquid-rich gas flow analysis under variable bottomhole pressure conditions, *J. Nat. Gas Sci. Eng.*, 46, 793–816.
35. H. **Emami-Meybodi** (2017) Stability analysis of dissolution-driven convection in porous media, *Phys. Fluids*, 29, 014102.
36. S. M. Jafari-Raad, H. **Emami-Meybodi**, H. Hassanzadeh (2016) On the choice of analogue fluids in CO<sub>2</sub> convective dissolution experiments, *Water Resour. Res.*, 52, 4458–4468
37. H. **Emami-Meybodi**, H. Hassanzadeh, C. P. Green, J. Ennis-King (2015) Convective dissolution of CO<sub>2</sub> in saline aquifers - Progress in modeling and experiments, *Int. J. Greenh. Gas Con.*, 40, 238–266.
38. H. **Emami-Meybodi**, H. Hassanzadeh, J. Ennis-King (2015) CO<sub>2</sub> dissolution in presence of background flow of saline aquifers, *Water Resour. Res.*, 51, 2595–2615.
39. H. **Emami-Meybodi** and H. Hassanzadeh (2015) Two-phase convective mixing under a buoyant plume of CO<sub>2</sub> in deep saline aquifers, *Adv. Water Resour.*, 76, 55–71.
40. H. **Emami-Meybodi**, H. K. Saripalli, H. Hassanzadeh (2014) Formation heating by steam circulation in a horizontal wellbore, *Int. J. Heat Mass Tran.*, 78, 886–992.

41. H. Emami-Meybodi and H. Hassanzadeh (2013) Stability analysis of two-phase buoyancy-driven flow in presence of capillary transition zone, *Phys. Rev. E*, 87, 033009.
42. H. Emami-Meybodi and H. Hassanzadeh (2013) Mixing induced by buoyancy-driven flows in porous media, *AIChE J.*, 59 (4) 1378–1389.
43. H. Emami-Meybodi (2012) Comment “Quantification of density-driven natural convection for dissolution mechanism in CO<sub>2</sub> sequestration”, *Transp. Porous Media*, 93 (3) 655–656.
44. H. Emami-Meybodi and H. Hassanzadeh (2011) Hydrodynamic dispersion in steady buoyancy-driven geological flows, *Water Resour. Res.*, 47, W12504 13PP
45. H. Emami-Meybodi (2012) Comments on the paper “Quantification of density-driven natural convection for dissolution mechanism in CO<sub>2</sub> sequestration” by R. Nazari Moghadam et al. (2011), *Transp. Porous Media*, 93 (1) 171–174
46. H. Emami-Meybodi, R. Kharrat, X. Wang (2011) Study of microscopic and macroscopic displacement behaviors of polymer solution in water-wet and oil-wet media, *Transp. Porous Media*, 89 (1) 97–120
47. H. Emami-Meybodi, R. Kharrat, M. Nasehi Araghi (2011) Experimental studying of pore morphology and wettability effects on microscopic and macroscopic displacement efficiency of polymer flooding, *J. Petro. Sci. Eng.*, 78(2) 347–363
48. H. Emami-Meybodi, R. Kharrat, B. Yadali Jamaloei (2011) Effect of orientation of strata on macroscopic sweep efficiency of water/polymer flooding in layered porous media, *J. Porous Media*, 14 (9) 761–776

#### Proceedings and Conferences

1. M. Ma, H. Emami-Meybodi, “Mass transport in shales considering multiscale continua with non-equilibrium phase behavior”, 1606293, *AGU Fall Meeting*, Washington, D.C., 9–13 December 2024.
2. D. Li, H. Emami-Meybodi, “Geological and operational insights to underground hydrogen storage in depleted gas reservoirs”, 1641804, *AGU Fall Meeting*, Washington, D.C., 9–13 December 2024.
3. M. Jin, H. Emami-Meybodi, “An integrated machine learning algorithm for bottomhole pressure prediction of vertical wells during fluid injection”, 1652146, *AGU Fall Meeting*, Washington, D.C., 9–13 December 2024.
4. C. Yang, H. Emami-Meybodi, “Fracture closure analysis using multiphase flowback data in shale gas-condensate reservoirs”, 1599303, *AGU Fall Meeting*, Washington, D.C., 9–13 December 2024.
5. K. Babatunde, H. Emami-Meybodi, “Multicomponent gas transport controlled by nonequilibrium adsorption kinetics in nanoporous media”, 1641522, *AGU Fall Meeting*, Washington, D.C., 9–13 December 2024.
6. M. Jin, H. Emami-Meybodi “An integrated machine learning algorithm for unconventional flowing bottomhole pressure prediction during dynamic gas lift operation”, SPE-222222-MS, *ADIPEC Exhibition & Conference*, 4–7 November 2024.
7. C. Yang, H. Emami-Meybodi, A. Kordestany, F. Zhang “Multiphase flowback rate transient analysis of multi-fractured horizontal wells in gas condensate shales” SPE-221380-MS, *SPE Eastern Regional Meeting*, Wheeling, WV, USA, 8–10 October 2024.
8. D. Li, H. Emami-Meybodi “Hydrogen mixing dynamics in depleted gas reservoirs”, SPE-220710-MS, *SPE Annual Technical Conference and Exhibition*, New Orleans, LA, USA, 23–25 September 2024.
9. C. Yang, H. Emami-Meybodi, F. Zhang, A. Kordestany “Three-phase flowback rate transient analysis of shale gas reservoirs” SPE-221032-MS, *SPE Annual Technical Conference and Exhibition*, New Orleans, LA, USA, 23–25 September 2024.

10. K. Babatunde, H. **Emami-Meybodi** “Binary gas transport with multilayer adsorption in nanoporous media” SPE-220768-MS, *SPE Annual Technical Conference and Exhibition*, New Orleans, LA, USA, 23–25 September 2024.
11. M. Ma, H. **Emami-Meybodi** “Multiscale non-equilibrium compositional modeling of cyclic gas injection in shale reservoirs” SPE-220728-MS, *SPE Annual Technical Conference and Exhibition*, New Orleans, LA, USA, 23–25 September 2024.
12. K. Babatunde, H. **Emami-Meybodi** “Diffusion-based modeling of enhanced gas recovery in organic-rich ultratight reservoirs”, SPE-218252-MS, *SPE Improved Oil Recovery*, Tulsa, OK, USA, 23–25 April 2024.
13. M. Ma, H. **Emami-Meybodi** “Inhomogeneous fluid transport modeling of gas injection in shale reservoirs considering fluid-solid interaction and pore size distribution”, IPTC-23473, *SPE Improved Oil Recovery*, Tulsa, OK, USA, 23–25 April 2024.
14. K. Babatunde, H. **Emami-Meybodi**, “Multi-species mass transport modeling of CO<sub>2</sub> injection in organic-rich shale gas reservoirs”, *International Petroleum Technology Conference*, Dhahran, Saudi Arabia, 12–14 February 2024.
15. F. Zhang, M. Xu, C. Deng, W. Zhang, C. Liu, Z. Rui, H. **Emami-Meybodi** “Deep-learning based LSTM for production data analysis of hydraulically fractured wells”, *International Petroleum Technology Conference (IPTC)*, Dhahran, Saudi Arabia, 12–14 February 2024.
16. K. Babatunde, H. **Emami-Meybodi**, “Modeling of adsorption-controlled multicomponent gas transport in nanoporous media”, *AGU Fall Meeting*, San Francisco, CA, 11–15 December 2023.
17. M. Ma, H. **Emami-Meybodi**, M. Ahmadi “Multicomponent inhomogeneous fluid transport in low permeability oil reservoirs”, *SPE Annual Technical Conference and Exhibition*, San Antonio, Texas, USA, 16–18 October 2023.
18. M. Miao, H. **Emami-Meybodi**, M. Ahmadi “Flowing bottom-hole pressure during gas lift in unconventional oil wells”, *SPE Annual Technical Conference and Exhibition*, San Antonio, Texas, USA, 16–18 October 2023.
19. F. Zhang, Z. Rui, Y. Pan, C. Yang, H. **Emami-Meybodi**, R. Wang, W. Zhang “A two-phase type-curve method with dynamic skin effects in hydraulically fractured reservoirs”, *SPE Annual Technical Conference and Exhibition*, San Antonio, Texas, USA, 16–18 October 2023.
20. M. Ma, H. **Emami-Meybodi** “Diffusion-based multiphase multicomponent modeling of cyclic solvent injection in ultratight reservoirs”, *SPE Annual Technical Conference and Exhibition*, Houston, Texas, USA, 3–5 October 2022.
21. Z. Liu, H. **Emami-Meybodi** “Gas Transport Modeling in Organic-rich Shales with Nonequilibrium Sorption Kinetics”, *SPE Annual Technical Conference and Exhibition*, Houston, Texas, USA, 3–5 October 2022.
22. F. Zhang, L. Zou, Z. Rui, H. **Emami-Meybodi**, W. Cui, “A two-phase flowback type-curve for multiscale fluid transport in hydraulically fractured shale reservoirs”, *SPE Offshore Technology Conference*, Houston, TX, USA, 2–5 May 2022.
23. K. Enab, H. **Emami-Meybodi**, “Impact of reservoir fluid and injection gas compositions on shales huff-n-puff performance in the presence of hysteresis, diffusion, and sorption”, *SPE Annual Technical Conference and Exhibition*, Dubai, UAE, 21–23 September 2021.
24. Z. Liu, H. **Emami-Meybodi**, “Continuum-scale modeling of fluid transport in organic-rich ultratight rocks based on pore-scale density distributions”, *SPE Annual Technical Conference and Exhibition*, Dubai, UAE, 21–23 September 2021.
25. F. Zhang, H. **Emami-Meybodi**, “Two-phase type curve analysis of flowback data from hydraulically fractured hydrocarbon reservoirs”, *SPE Annual Technical Conference and Exhibition*, Dubai, UAE, 21–23 September 2021.
26. F. Zhang, H. **Emami-Meybodi**, “Analysis of flowback and early-time production data from shale gas wells”, *SPE Eastern Regional Meeting*, Farmington, PA, 19–21 April 2021.

27. Z. Liu, H. **Emami-Meybodi**, "Diffusion-based modeling of gas transport in organic-rich ultratight reservoirs", *SPE Annual Technical Conference and Exhibition*, Houston, TX, 27–29 October 2020.
28. F. Zhang, H. **Emami-Meybodi**, "Fracture characterization during flowback with two-phase flow in tight and ultratight oil reservoirs", *SPE Annual Technical Conference and Exhibition*, Houston, TX, 12–14 October 2020.
29. Z. Liu, H. **Emami-Meybodi**, "Linear flow model with piecewise constant coefficients for infinite-acting reservoirs with pressure-dependent properties", *AGU Fall Meeting*, San Francisco, CA, 9–13 December 2019.
30. M. Cronin, H. **Emami-Meybodi**, R. Johns, "Multicomponent diffusion modeling of cyclic solvent injection in ultratight reservoirs", *SPE Annual Technical Conference and Exhibition*, Calgary, Canada, 30 September–2 October 2019.
31. F. Zhang and H. **Emami-Meybodi**, "Characterization of hydraulic fractures during flowback using rate transient analysis", *Annual Conference of the International Association for Mathematical Geosciences*, State College, PA, USA, 10-16 August 2019.
32. M. Zhang, N. Chakraborty, Z. Karpyn, H. **Emami-Meybodi**, L. Ayala, "Numerical and experimental analysis of diffusion and sorption kinetics effects in Marcellus shale gas transport", *SPE Reservoir Simulation Conference*, Galveston, TX, USA, 10-11 April 2019.
33. F. Zhang and H. **Emami-Meybodi** "Evaluation of Changes in Fracture Properties during Production Using Rate Transient Analysis", SPE- 191817, *SPE Eastern Regional Meeting*, Pittsburg, PA, USA, October 2018.
34. M. Cronin, H. **Emami-Meybodi**, R. T. Johns "Diffusion-dominated proxy model for solvent injection in ultra-tight oil reservoirs", SPE-190305, *SPE Improved Oil Recovery*, Tulsa, OK, USA, April 2018.
35. H. **Emami-Meybodi** and H. Hassanzadeh, Two-phase convective mixing of carbon dioxide in deep saline aquifers: Effect of capillary transition zone, *Canadian Chemical Engineering*, Fredericton, NB, Canada, October 2013.
36. M. Rafiee, M. Y. Soliman, E. Pirayesh, H. **Emami-Meybodi**, Geomechanical considerations in hydraulic fracturing designs, SPE 162637, *SPE Canadian Unconventional Resources*, Calgary, AB, Canada, November 2012.
37. H. **Emami-Meybodi**, R. Kharrat, M. Ghazanfari, Effect of heterogeneity of layered reservoirs on polymer flooding: An experimental approach using five-spot glass micromodel, SPE 113820, *EUROPEC*, Rome, Italy, June 2008.

#### Patents/Others

1. R. T. Johns, H. **Emami-Meybodi**, M. Cronin (2022) Method for improved recovery in ultra-tight reservoirs based on diffusion. US Patent, Application No. 62/643,367, 51 pages.
2. H. **Emami-Meybodi**, R. T. Johns, M. Cronin (2019) Understanding physics could lead to big gains in shale oil recovery, Several news outlets.
3. H. **Emami-Meybodi** (2018) More to carbon than meets the eye: Importance of researching carbon capture, utilization, and storage (CCUS), *The Way Ahead SPE Journal*.

#### HONORS AND AWARDS

1. Outstanding Associate Editor Award, SPE Journal, 2022, 2023, 2024
2. Distinguished Achievement Award for Petroleum Engineering Faculty, Eastern North America Region, Society of Petroleum Engineers, 2023
3. A Peer Apart Award, SPE's Technical Journals, Society of Petroleum Engineers, 2022
4. Dr. Charles H. Bowman and Lynn A. Holleran Early Career Professorship in Petroleum and Natural Gas Engineering, Penn State University, 2022 – 2025
5. Outstanding Technical Reviewer Award, SPE Journal, 2021 and 2023

6. Matthew J. Wilson, Jr. Travel Grant, EMS College, Penn State University, 2022
7. E. Willard & Ruby S. Miller Faculty Fellowship, Penn State University, 2021 – 2026
8. Quentin E. and Louise L. Wood Endowed Faculty Fellow in Petroleum and Natural Gas Engineering, Penn State University, 2021 – 2022
9. Service Award, Eastern North America Region, Society of Petroleum Engineers, 2021
10. Matthew J. Wilson, Jr. Travel Grant, EMS College, Penn State University, 2020
11. Cedric K. Ferguson Medal, Society of Petroleum Engineers, 2019
12. Matthew J. Wilson, Jr. Travel Grant, EMS College, Penn State University, 2019
13. Wilson Research Initiation Grant, Penn State University, 2019
14. Matthew J. Wilson, Jr. Travel Grant, EMS College, Penn State University, 2018
15. Reservoir Description and Dynamics Award, Eastern North America Region, Society of Petroleum Engineers, 2018
16. Matthew J. Wilson, Jr. Travel Grant, EMS College, Penn State University, 2018
17. Gladys Snyder Junior Faculty Grant, EMS College, Penn State University, 2016
18. Endeavour Research Fellowship, Department of Education, Australia, 2014 – 2015
19. Alberta Innovates Technology Futures Fellowship, AITF, Canada, 2014 – 2015
20. Engineering Graduate Excellence Scholarship, University of Calgary, 2014
21. Eyes High International Doctoral Scholarship, University of Calgary, Canada, 2013
22. Best Poster Prize, University of Warwick, UK Energy Research Centre, UK, 2013
23. UKERC Energy and Environment School, UK Energy Research Centre, UK, 2013
24. Schulich Student Activities Fund, University of Calgary, Canada, 2013
25. Faculty of Graduate Studies Travel Grant, University of Calgary, Canada, 2013
26. CMC Travel Grant, Carbon Management Canada, 2013
27. PennWest Graduate Excellence Scholarship, PennWest Exploration, Canada, 2012
28. OMAE Graduate Excellence Scholarship, American Society of Mechanical Engineering, 2012
29. Petroleum Systems Graduate Excellence Scholarship, University of Regina, Canada, 2009
30. NIOC Dual-Degree Program Scholarship, National Iranian Oil Company, Iran, 2005 – 2007
31. NIOC Bachelor's Degree Scholarship, National Iranian Oil Company, Iran, 2001 – 2005

## RESEARCH PROJECTS

1. Multiphase multicomponent fluid transport in nanoporous media
2. ML tools for CO<sub>2</sub> storage in subsurface reservoirs
3. Cyclic solvent injection in ultratight reservoirs
4. Capillary trapping controlled by geochemical reactions in porous media
5. Flowback rate transient analysis of multi-fractured horizontal wells (Completed)
6. Gas lift optimization in unconventional oil reservoirs (Completed)
7. Instability of convective dissolution of CO<sub>2</sub> in deep saline aquifers (Completed)
8. Artificial neural network models for chemical enhanced oil recovery processes (Completed)
9. Solubility trapping of carbon dioxide in deep saline aquifers (Completed)
10. Production data analysis of liquid-rich gas reservoirs (Completed)
11. Mixing induced by buoyancy-driven flows in porous media (Completed)
12. Geomechanics consideration in hydraulic fracturing (Completed)

13. Modeling of heat/mass transfer near wellbore formation during steam injection (Completed)
14. Experimental study of polymer flooding using five-spot glass micromodels (Completed)
15. Impact of reservoir fluid properties on gas-lift design (Completed)

## RESEARCH SUPERVISION

1. **Chia-Hsin Yang**      **PhD**, Energy and Mineral Engineering, Spring 2028 (expected)  
“Multiphase flowback rate transient analysis of unconventional wells”
2. **Qian Zhang**      **PhD**, Energy and Mineral Engineering, Spring 2028 (expected)  
“Fluid injection in low-permeability reservoirs by considering mass transport and heat transfer”
3. **Dexuan Li**      **PhD**, Energy and Mineral Engineering, Spring 2026 (expected)  
“Hydrogen loss and contamination during seasonal hydrogen storage in depleted gas reservoirs”
4. **Kawthar Babatunde**      **PhD**, Energy and Mineral Engineering, Spring 2025 (expected)  
“Multicomponent gas transport in nanoporous media controlled by adsorption”
5. **Miao Jin**      **PhD**, Energy and Mineral Engineering, Spring 2025 (expected)  
“Prediction of flowing bottomhole pressure for unconventional wells using machine learning techniques”
6. **Ming Ma**      **PhD**, Energy and Mineral Engineering, Fall 2024 (expected)  
“Multiphase multicomponent modeling of cyclic solvent injection in ultratight reservoirs”
7. **Zizhong Liu**      **PhD**, Energy and Mineral Engineering, Summer 2022  
“Adsorption-controlled gas transport in nanoporous media”
8. **Fengyuan Zhang**      **PhD**, Energy and Mineral Engineering, Fall 2020  
“Flowback rate transient analysis of multi-fractured horizontal wells in tight and ultratight reservoirs”
9. **Michael Cronin**      **PhD**, Energy and Mineral Engineering, Summer 2020  
“Cyclic solvent injection in ultratight reservoirs based on the diffusion process”, Co-advisor: Russell T. Johns
10. **Almat Saginbayev**      **MSc**, Energy and Mineral Engineering, Summer 2026  
“Machine learning-based prediction of fluid properties in nanopores”
11. **Naif Alnahdi**      **MSc**, Energy and Mineral Engineering, Summer 2026  
“Hydrogen loss and contamination during seasonal storage in depleted hydrocarbon reservoirs”
12. **Chia-Hsin Yang**      **MSc**, Energy and Mineral Engineering, Fall 2024  
“Three-phase flowback rate transient analysis of gas condensate wells”
13. **Yusuf Shakeel**      **MSc**, Energy and Mineral Engineering, Summer 2022  
“Diffusion-based modeling of binary gas transport in organic-rich ultratight reservoirs”
14. **Mohammad Abdullah**      **MSc**, Energy and Mineral Engineering, Spring 2019  
“Artificial neural network models for chemical enhanced oil recovery processes”, Co-advisor: Turgay Ertekin
15. **Yun Yang**      **MSc**, Energy and Mineral Engineering, Fall 2017  
“Mathematical development for flowback rate transient analysis”, Co-advisor: Luis F. Ayala



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| 16. Madhu Singh         | <b>MSc</b> , Energy and Mineral Engineering, Spring 2017<br>“Density-based rescaled exponential model for gas-condensate reservoirs during boundary-dominated flow” |
| 17. Chia-Hsin Yang      | <b>BSc Intern</b> , Energy and Mineral Engineering, Summer 2023<br>“Early time production data analysis of unconventional oil wells”                                |
| 18. Kory Kearns         | <b>BSc Intern</b> , Energy and Mineral Engineering, Summer 2021<br>“Flowback production data analysis of shale reservoirs”  |
| 19. Collin Herndon      | <b>BSc Intern</b> , Energy and Mineral Engineering, Summer 2020<br>“Pulsed gas injection in fractured tight oil reservoirs”   |
| 20. Mostafa Jafari-Raad | <b>Visiting PhD scholar</b> , 2018<br>“Instability of convective dissolution of CO <sub>2</sub> in deep saline aquifers”  |

## GRADUATE STUDENT COMMITTEE

### Ph.D. Committee External Examiner

1. Yu, H. (Spring 2024) Pore-Scale Modeling for Interphase Mass Transfer during the VAPEX Process, Department of Civil and Environmental Engineering, University of Alberta
2. Gang, H. (Fall 2021) An Integrated Approach to Characterize Hydraulic Fracturing-Induced Seismicity in Shale Reservoirs, Department of Chemical and Petroleum Engineering, University of Calgary
3. Zhang, C. (Spring 2018) Reservoir Modeling Using Automated Solution Techniques: Solver Development, Application, and Optimization, Department of Engineering Science, University of Auckland

### Ph.D. Committee Member

1. Wu, Y. (Comp. exam, Spr. 2023) Caprock Integrity Analysis of the Interaction Between Elastoplastic Caprock and Poroelastic Reservoir
2. Zhang, Q. (Comp. exam, Fall 2022) Techniques to Improve Heat Extraction in Enhanced Geothermal Systems
3. Su, X. (Sum. 2023) Geomechanics of Disturbances in Pore Fluid Pressure of The Subsurface Rocks with Applications in Stability Analysis of Infill Wells in Depleted Reservoirs
4. Nobrega, J. (Sum. 2022) Production Data Analysis of Unconventional Gas Reservoirs with Variable Inner Boundary Constraints
5. Wang, Z. (Sum. 2022) Pore-Scale Study on Partially Multiphase Transport in Liquid-Rich Shale Gas Reservoirs Using the Lattice Boltzmann Method
6. Zhang, W. (Sp. 2022) Nonlinear Poroelastic Solutions for the Pore Fluid Flow and Sorption in Deformable Rocks
7. Chandna, A. (Fall 2020), Modeling Natural Fracture Networks Using Improved Geostatistical and Geomechanical Inferences
8. Santos, L. Y. (Sp. 2020) A Comprehensive Wellbore Cement Integrity Analysis & Remedies
9. Zhi, W. (Fall 2019) Understanding Hydrological and Biogeochemical Control on Solute Export Pattern at Watershed Scale
10. Singh, M. (Sp. 2019) Quantitative Inversion of Microseismic Data: Bayesian Model Selection Using Fast Proxies for Fracturing and Wave Propagation
11. Chakraborty, N. (Sp. 2019) Fundamental Investigation of Gas Storage/Transport in Shales

12. Schwartz, B. (Fall 2018) The Role of Pore Structure in Permeability Evolution Observed in Laboratory Studies of Marcellus and Wolfcamp Shale
13. Zhang, R. (Fall 2018) Pore Structure & Sorption Behavior of Unconventional Reservoir Rocks
14. Udegbe, E. (Sum. 2018) Pattern Recognition for Fractured Res. Characterization using Big Data
15. Zhang, C. (Sp. 2018) Reservoir Modeling Using Automated Solution Techniques: Solver Development, Application, and Optimization
16. Cai, Z. (Sp. 2018) Understanding Reactive Transport of Marcellus Shale Waters
17. Lei, X. (Sp. 2018) Joint Inversion of Compressional/Shear Wave Attenuation to Characterize Gas Res.
18. Li, L. (Fall 2017) Effects of Hysteresis and Heterogeneity on the Gas Flooding Performance
19. Rana, S., Development of Assisted History Matching Tool Using Gaussian Process Based Proxy Models and Variogram Based Sensitivity Analysis
20. Torrealba, V. (Fall 2017) Thermodynamics of Microemulsion Systems: Partitioning Relationships, Phase Behavior and Interfacial Tensions
21. Putcha, V. (Sum. 2017) Integration of Numerical and Machine Learning Protocols for Coupled Reservoir-Wellbore Models: A Study for Continuous Gas Lift Optimization
22. Zhang, Z. (Sum. 2017) Predicting Petrophysical Properties from Rate Transient Data: An AI Application

#### **M.Sc. Committee Member**

1. Yoga, H. (Sp. 2022) Machine Learning Approach For Prediction of Relative Permeability
2. Lou, X. (Sum. 2019) Experimental Study of Gas-Liquid Diffusion in Porous Rocks and Bulk Fluids
3. Joon, S. (Fall 2018) Velocity Model Calibration Using Distributed Acoustic Sensors & Sparse Geophones
4. Zhong, X. (Sum. 2018) Pressure Transient Analysis of Shale Gas Reservoir with Horizontal Boreholes: An Artificial Intelligence Based Solution
5. Ahn, E. (Sp. 2018) Multi-Well Analytical Solution for Coning Under Simultaneous Steady-State Flow of Three Phases
6. Galimberti, E. (Sp. 2018) Dispersion and Its Effect on the Surfactant-Polymer Flooding Process
7. Da, L. (Fall 2017) Screening and Design Criteria for Slanted Wells
8. Rajendren, K. (Fall 2017) Integration of Random-pore Model and Langmuir-Hinshelwood Kinetics to Study High Temperature Coal Gasification.
9. Nguema, C. A. (Sum. 2017) Development of Artificial Neural Networks Applicable to Single Phase Unconventional Gas Reservoirs with Slanted Wells.
10. Zhang, Y. (Sum. 2017) Characterization of Tight Gas Reservoirs with Stimulated Reservoir Volume in an Artificial Intelligence Application
11. Shang, B. (Sum. 2017) Design of Brine Disposal Wells in Depleted Gas Reservoirs via Artificial Neural Network Protocols
12. Ozesen, A. (Sum. 2017) Analysis of Instantaneous Shut-in Pressure in Shale Oil and Gas Reservoirs

13. Will, R. (Sum. 2017) A General Compositional Rescaled-Exponential for Multi-Phase Flow Analysis During Boundary-Dominated Flow
14. Ersahin, A. (Fall 2016) An Artificial Neural Network Approach for Evaluating the Performance of Cyclic Steam Injection in Naturally Fractured Heavy Oil Reservoirs
15. Hu, G. (Sum. 2016) Biostimulation Impact on Gas Adsorption Capacity and Micro-Scale Gas Transportation for Illinois Coal
16. Feng, Y. (Sum. 2016) RTA of Gas/Water Two Phase Reservoirs: A Density-Based Approach
17. Lia, I.-A. (Sum. 2016) Development of an Artificial Neural Network Model for Designing Water Flooding Projects in Three-Phase Reservoirs
18. de Carvalho, R. (Sp. 2016) Simulation and Optimization of Natural Gas Transportation in Pipeline Networks Using a Linearized Model
19. Zhang, T., Numerical Investigation of Fractured Cement Degradation by Carbonated Brine Injection in a Tortuous Rough-Walled Fracture
20. Chakraborty, N. (Fall 2015) Experimental Investigation of Effective Matrix Permeability and the Effect of Soaking Time in Ultra-Tight Shales
21. Pakoz, U. (Fall 2015) Effect of Changing Injection Water Salinity on Oil Recovery from Oil-Wet Carbonate Rocks

## COURSES TAUGHT

**Surface Production Engineering (PNG 480) @ Penn State University (USA):** Fundamentals of surface production operations and underlying operational principles, 2016 – presents

**Production Engineering Laboratory (PNG 482) @ Penn State University (USA):** Basic measurements and production engineering principles in surface facilities, 2016 – presents

**Unconventional Resources Analysis (PNG 555) @ Penn State University (USA):** Reservoir engineering aspects and characteristics of unconventional reservoirs, 2016 – presents

**Unconventional Reservoirs @ University of Los Andes (Colombia):** Reservoir engineering analysis of unconventional reservoirs (shales, CBM, tight sands, gas hydrates), 2018 – presents

**Waterflooding @ Petroleum Engineering Summer School (Croatia):** Waterflood performance, surveillance, and case studies, 2023

**Behavior of Liquids, Gases & Solids Laboratory (ENGG 201) @ University of Calgary (Canada):** Measurement of basic thermodynamic and transport properties of fluids & solids, 2014 – 2015

**Natural Gas Distribution Systems @ National Gas Company (Iran):** Fundamentals of gas distributions and related operations, 2007 – 2008

## UNIVERSITY SERVICE

**Vice Chair,** University Senate Committee for Research, Scholarship, & Creative Activity, 2024

**Elected Member,** Penn State University Faculty Senate, 2022 – present

**University Representative,** Aramco College Fair in Dhahran, Saudi Arabia, 2023

**Department Representative,** Energy-Related Engineering Colleges in Beijing, China, 2023

**Member,** EMS College Graduate Faculty Nomination Evaluation Committee, 2022 – 2023

**Member,** CoE+ DEIB Department Leads Committee, Engineering Departments, 2023

**Chairperson,** EME-PNGE Faculty Search Committee, 2023

**Member**, EME Department Head Search Advisory Committee, 2022 – 2023  
**Elected Member**, EME Department Faculty Promotion and Tenure Committee, 2021 – 2023  
**Member**, EME Graduate Student Committee, 2019 – 2022  
**Chairperson**, EME PhD Qualifying Examination Committee, 2021 – 2022  
**Member**, EME PhD Qualifying Examination Committee, 2018 – 2021  
**Member**, CIES-EME Faculty Search Committee, 2020  
**Member**, EME-Industry Collaboration Committee, 2020  
**Member**, EME Efficient Teaching Opportunities and Strategies Committee, 2017  
**Member**, EME Lab and Space Planning Committee, 2017  
**Elected Member**, Faculty Activity Summary Review Committee, 2017  
**Member**, Energy Institute Strategic Planning Committee, 2020  
**Member/Participant**, EME Department Faculty Hiring Committee, 2017 – present  
**Judge**, Student Paper Contest, Penn State SPE Student Chapter, 2017 – present  
**Judge**, EMS Graduate Research Showcase, EMS Graduate Student Council, 2017 – present  
**Faculty Coordinator/Presenter**, Earth and Mineral Sciences Exposition (EMEX), 2019 – present  
**Faculty Coordinator**, PNGE Program Representative, 2016 – present  
**Chairperson**, Iranian American Academics Professionals Scholarships, Penn State, 2017 – 2019

## PROFESSION SERVICE

**Associate Editor**, SPE Journal, 2019 – present  
**Reservoir Advisory Committee Member**, Society of Petroleum Engineers (SPE) International, 2024 – present  
**Award Committee Member**, SPE International, 2024 – present  
Major awards, technical awards, and service awards  
**Session Chair and Technical Program Committee Member**, SPE Improved Oil Recovery Conference – Critical Technologies of the Future, Tulsa, OK, April 2024  
**Organizing Committee Member**, SPE/PEDHA Workshop: Fueling the Future – Petroleum Engineering Industry/Education in a New Era, Houston, TX, August 2024  
**Founding Committee Member**, Interpore- Midwest & Northeast US Chapter, 2022 – present  
**Guest Editor**, Journal of Applied Energy, Special Issue of “Carbon Capture, Utilization and Storage”, 2023 – 2024  
**Guest Editor**, Journal of Advances in Applied Energy, Special Issue of “Carbon Capture, Utilization and Storage”, 2023 – 2024  
**Guest Editor**, Journal of Energy Resources Technology, Special Issue of “International Carbon Capture, Utilization and Storage Conference 2023”, 2024  
**Scholarship and Fellowship Committee Member**, SPE International, 2018 – present  
Gus Archie Scholarship, Nico van Wingen Graduate Fellowship, Donald G. Russell Scholarship, Henry DeWitt Smith Fellowship, Imomoh Scholarship  
**Associate Editor**, Journal of Petroleum Exploration and Production Technology, 2016 –2020

**Faculty Advisor**, Penn State SPE Student Chapter, 2018 – present

**Organizing/Scientific Committee Member**, 20th International Association for Mathematical Geosciences (IAMG) Conference, State College, PA, August 2019

**Organizer**, Interpore 10th Annual Meeting and Jubilee Conference, New Orleans, LA, May 2018

**External Examiner**, Petroleum Eng. Program, University of Trinidad and Tobago, 2016 – 2019

**Guest Editor**, Journal of Mathematical Geosciences, Special Issue for “IAMG 2019 Conference”, 2019 – 2020

**Guest Editor**, Journal of Fluids, Special Issue of “Fundamentals of CO<sub>2</sub> Storage in Geological Formations”, 2017 – 2018

**Research Proposal Reviewer**, Peer Review of Grant Proposals, 2017 – present  
US National Science Foundation; American Chemical Society – PRF; United States-Israel Binational Science Foundation; Israel Science Foundation; Swiss National Science Foundation; KAUST

**Book Reviewer**, Peer Review of Book Proposals, 2015 – present  
Elsevier and Springer

**Reviewer**, Peer Review of Manuscripts, 2011 – present  
AAPG Bulletin; Asia-Pacific Journal of Chemical Engineering; Chemical Engineering Science; Earth-Science Reviews; International Journal of Greenhouse Gas Control; International Journal of Heat and Mass Transfer; International Journal of Multiphase Flow; Journal of Advances in Water Resources; Journal of Energies; Journal of Energy and Fuels; Journal of Energy Resources Technology; Journal of Environmental Earth Sciences; Journal of Fluids; Journal of Fuel; Journal of Greenhouse Gases: Science and Technology; Journal of Hydrology; Journal of Mathematical Geosciences; Journal of Natural Gas Science and Engineering; Journal of Petroleum Exploration & Production Technology; Journal of Petroleum Science and Engineering; Journal of Physics of Fluids; Journal of Porous Media; Journal of Reservoir Evaluation and Engineering; Journal of Transport in Porous Media; Journal of Water Resources Research; Journal of Zhejiang University Science A; Petroleum; SPE Journal

## PROFESSIONAL ASSOCIATIONS

- Society of Petroleum Engineers (SPE), 2005 – present
- American Chemical Society (ACS), 2023 – present
- International Association for Mathematical Geosciences (IAMG), 2019
- Association of Engineers Geologists and Geophysicists Alberta (APEGA), 2012 – 2020
- American Physical Society (APS), 2015
- American Geophysical Union (AGU), 2014 – 2016
- Canadian Heavy Oil Association (CHOA), 2013 – 2015
- Canadian Society for Chemical Engineering (CSChE), 2013

*October 2024*