Sahar Bakhshian

Professional Summary

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Professional Preparation

Academic Background

Ph.D., Chemical Engineering, University of Southern California, January 2018

M.Sc., Chemical Engineering, Sharif University of Technology, Tehran, Iran, August 2010

B.Sc., Chemical Engineering, Isfahan University of Technology, Isfahan, Iran, August 2007

Professional Appointments

Research Associate, Bureau of Economic Geology, The University of Texas at Austin (August 2019-Present)

Postdoctoral Fellow, Bureau of Economic Geology, The University of Texas at Austin (February 2018-August 2019)

Areas of Expertise

Areas of Expertise

Computational Fluid Dynamics (CFD)
Multiphase flow in porous media

Awards

Awards and Honorary Societies

2024 Tinker Family BEG Publication Award, Exemplary Publication of Scientific or Economic Impact, for timely and foundational work toward CO2 storage security, 2024

Career Development Publication Award, 2019-2020

Career Development Publication Award, 2018-2019

Best Dissertation Award in Chemical Engineering, University of Southern California (USC), 2018

Best Poster Award at the Texas Advanced Computing Center (TACC) Symposium, 2018

Mork Family Department of Chemical Engineering Best Teaching Assistant Award, 2017

Ph.D. Merit Award, University of Southern California Women in Science & Engineering (USC WiSE), 2017

12th Annual Mork Family Department Student Symposium, Best Poster Presentation Award, University of Southern California, 2016

University of Southern California Women in Science & Engineering (USC WiSE) Travel Grant Recipient: 8th International Conference on Porous Media & Annual Meeting, Cincinnati, Ohio, USA, 2015

USC Mork Family Doctoral Fellowship, Support with Tuition and Stipend, 2013-2015

Presentations

Presentations

Experimental Investigation and Modelling of the Impact of Small-Scale Heterogeneities in Geologic Carbon Storage (poster): presented at AGU Fall Meeting, San Francisco, Calif., December 11-15, 2023.

Teaching Teamwork: Project-based Learning in an Interdisciplinary Course Delivered by an Interdisciplinary Teaching Team (poster): presented at Earth Educators Rendezvous, Pasadena, Calif., July 10-14, 2023.

Experimental Investigation of CO2 Buoyant Flow Saturation in Ripple Bedforms: presented at SPE/AAPG/SEG Carbon Capture, Utilization, and Storage (CCUS) Conference, Houston, Tex., April 25-27, 2023.

Predicting CO2 gravity-driven drainage saturation using machine learning (poster): presented at AAPG's Carbon Capture, Utilization, and Storage (CCUS) Conference, Houston, Tex., March 29-31, 2022.

Predicting CO2 saturation for heterogeneous domains using machine learning: presented at University of Texas Sixth Conference on Carbon Capture and Storage (UTCCS-6), Austin, Tex., January 25-27, 2022.

Predicting CO2 gravity-driven drainage saturation using machine learning: presented at AGU Fall Meeting, New Orleans, La., December 13-17, 2021.

Modeling of convective carbon dioxide dissolution in porous media: from pore to Darcy scale: presented at American Geophysical Union Fall Meeting 2019, San Francisco, Calif., December 9-13, 2019.

Pore-scale study of spontaneous imbibition in fractured rocks using the lattice Boltzmann method: presented at American Geophysical Union Fall Meeting 2019, San Francisco, Calif., December 11, 2019.

A parallel pore-scale multiphase flow tool using the lattice Boltzmann method: presented at 72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Seattle, Wash., November 23-26, 2019.

Modeling solutal convection in porous media: from pore to Darcy scale: presented at 72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, Seattle, Wash., November 23-26, 2019.

A high performance lattice Boltzmann solver with applications to multiphase flow in porous media: presented at TACCSTER 2019: Texas Advanced Computing Center Symposium for Texas Researchers, Austin, Tex., September 26-27, 2019.

Pore-scale simulation of wettability effects on CO2 storage efficiency in deep saline aquifers: presented at InterPore2019: 11th Annual Meeting of the International Society for Porous Media, Valencia, Spain, May 6-10, 2019.

A parallel pore-scale simulator for multiphase flow in 3D digital rock images: presented at Rice Oil & Gas High Performance Computing Conference, Houston, Tex., March 4-6, 2019.

The impact of wettability heterogeneity on multiphase flow in realistic rock models: presented at American Geophysical Union Fall Meeting 2018, Washington, D.C., December 12, 2018.

Development of a parallel pore-scale fluid flow simulator with application to geological storage of CO2: presented at TACCSTER 2018: Texas Advanced Computing Center Symposium for Texas Researchers, Austin, Tex., September 20-21, 2018.

Publications

Peer Reviewed Authored Books

Bump, A., Bakhshian, S., Hovorka, S. D., and Rhodes, J., 2022, Criteria for depleted reservoirs to be developed for CO2 storage: Cheltenham, UK, IEA Environmental Projects Ltd., IEAGHG Technical Report, v. 2022-01, 114 p.

Peer Reviewed Journal Articles

Ni, H., Bump, A. P., and Bakhshian, S., 2024, An experimental investigation on the CO2 storage capacity of the composite confining system: International Journal of Greenhouse Gas Control, v. 134, no. 104125, 10 p., http://doi.org/10.1016/j.ijggc.2024.104125.

Bakhshian, S., Bump, A. P., Pandey, S., Ni, H., and Hovorka, S. D., 2023, Assessing the potential of composite confining systems for secure and long-term CO2 retention in geosequestration: Scientific Reports, v. 13, no. 21022, 14 p., http://doi.org/10.1038/s41598-023-47481-2.

Bump, A. P., Bakhshian, S., Ni, H., Hovorka, S. D., Olariu, M. I., Dunlap, D., Hosseini, S. A., and Meckel, T. A., 2023, Composite confining systems: Rethinking geologic seals for permanent CO2 sequestration: International Journal of Greenhouse Gas Control, v. 126, no. 103908, 12 p., http://doi.org/10.1016/j.ijggc.2023.103908.

Ni, H., Bakhshian, S., and Meckel, T. A., 2023, Effects of grain size and small-scale bedform architecture on CO2 saturation from buoyancy-driven flow: Scientific Reports, v. 13, no. 2474, 13 p., http://doi.org/10.1038/s41598-023-29360-y.

Bakhshian, S., Shariat, A., and Raza, A., 2022, Assessment of CO2 storage potential in reservoirs with residual gas using deep learning: Interpretation, v. 10, no. 3, p. SG11-SG20, http://doi.org/10.1190/INT-2021-0147.1.

Ulfah, M., Hosseini, S., Hovorka, S., Bump, A., Bakhshian, S., and Dunlap, D., 2022, Assessing impacts on pressure stabilization and leasing acreage for CO2 storage utilizing oil migration concepts: International Journal of Greenhouse Gas Control, v. 115, no. 103612, 13 p., http://doi.org/10.1016/j.ijggc.2022.103612.

Bakhshian, S., 2021, Dynamics of dissolution trapping in geological carbon storage: International Journal of Greenhouse Gas Control, v. 112, no. 103520, 10 p., http://doi.org/10.1016/j.ijggc.2021.103520.

Bakhshian, S., and Romanak, K., 2021, DeepSense: a physics-guided deep learning paradigm for anomaly detection in soil gas data at geologic CO2 storage sites: Environmental Science and Technology, v. 55, no. 22, p. 15531-15541, http://doi.org/10.1021/acs.est.1c04048.

Bakhshian, S., Rabbani, H. S., and Shokri, N., 2021, Physics-driven investigation of wettability effects on two-phase flow in natural porous media: recent advances, new insights, and future perspectives: Transport in Porous Media, v. 140, p. 85-106, http://doi.org/10.1007/s11242-021-01597-z.

Dashtian, H., and Bakhshian, S., 2021, Effects of salinity and shear stress on clay deformation: a molecular dynamics study: The Journal of Chemical Physics, v. 155, no. 134304, 11 p., http://doi.org/10.1063/5.0062919.

Feng, D., Bakhshian, S., Wu, K., Song, Z., Ren, B., Li, J., Hosseini, S. A., and Li, X., 2021, Wettability effects on phase behavior and interfacial tension in shale nanopores: Fuel, v. 290, no. 119983, 17 p., http://doi.org/10.1016/j.fuel.2020.119983.

Bakhshian, S., Hosseini, S. A., and Lake, L. W., 2020, CO2-brine relative permeability and capillary pressure of Tuscaloosa sandstone: effect of anisotropy: Advances in Water Resources, v. 135, no. 103464, 13 p., http://doi.org/10.1016/j.advwatres.2019.103464.

Bakhshian, S., Murakami, M., Hosseini, S. A., and Kang, Q., 2020, Scaling of imbibition front dynamics in heterogeneous porous media: Geophysical Research Letters, v. 47, no.

e2020GL087914, 10 p., http://doi.org/10.1029/2020GL087914.

Bakhshian, S., Rabbani, H. S., Hosseini, S. A., and Shokri, N., 2020, New insights into complex interactions between heterogeneity and wettability influencing two-phase flow in porous media: Geophysical Research Letters, v. 47, no. e2020GL088187, 10 p., http://doi.org/10.1029/2020GL088187.

Feng, D., Wu, K., Bakhshian, S., Hosseini, S. A., Li, J., and Li, X., 2020, Nanoconfinement effect on surface tension: perspectives from molecular potential theory: Langmuir, v. 36, no. 30, p. 8764-8776, http://doi.org/10.1021/acs.langmuir.0c01050.

Bakhshian, S., and Hosseini, S. A., 2019, Pore-scale analysis of supercritical CO2-brine immiscible displacement under fractional-wettability conditions: Advances in Water Resources, v. 126, p. 96-107, http://doi.org/10.1016/j.advwatres.2019.02.008.

Bakhshian, S., and Hosseini, S. A., 2019, Prediction of CO2 adsorption-induced deformation in shale nanopores: Fuel, v. 241, p. 767-776, http://doi.org/10.1016/j.fuel.2018.12.095.

Bakhshian, S., Hosseini, S. A., and Shokri, N., 2019, Pore-scale characteristics of multiphase flow in heterogeneous porous media using the lattice Boltzmann method: Scientific Reports, v. 9, no. 3377, 13 p., http://doi.org/10.1038/s41598-019-39741-x.

Dashtian, H., Bakhshian, S., Hajirezaie, S., Nicot, J.-P., and Hosseini, S. A., 2019, Convection-diffusion-reaction of CO2-enriched brine in porous media: a pore-scale study: Computers and Geosciences, v. 125, p. 19-29, http://doi.org/10.1016/j.cageo.2019.01.009.

Non Peer Reviewed Journal Articles

Bump, A., Bakhshian, S., Ni, H., Hovorka, S. D., Dunlap, D. B., Olariu, M. I., Hosseini, S. A., and Meckel, T., 2022, Composite confining systems: rethinking geologic seals for permanent CO2 sequestration: 16th Greenhouse Gas Control Technologies Conference, 23-27 October, Lyon, France, http://doi.org/10.2139/ssrn.4286411.

Conference Proceedings

Bakhshian, S., and Hosseini, S. A., 2021, Pore-scale study of capillary and dissolution trapping of CO2 in saline aquifers, The 15th Greenhouse Gas Control Technologies Conference, March 15-18, no. 3816758, Abu Dhabi, United Arab Emirates, 9 p.

Bakhshian, S., and Hosseini, S. A., 2021, Predicting the CO2 footprint in saline aquifers: a numerical-analytical hybrid model (abs.), Proceedings of the 15th Greenhouse Gas Control Technologies Conference, March 15-18, Abu Dhabi, United Arab Emirates, 2 p.

Published Abstracts

Bakhshian, S., and Hosseini, S. A., 2019, A parallel pore-scale multiphase flow tool using the lattice Boltzmann method (abs.): Bulletin of the American Physical Society, 72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, v. 64, no. 13, abs. no. NP05.00120, 1 p.

Hesse, M., Wen, B., Bakhshian, S., and Hosseini, S., 2019, Modeling solutal convection in porous media: from pore to Darcy scale (abs.): Bulletin of the American Physical Society, 72nd Annual Meeting of the American Physical Society Division of Fluid Dynamics, v. 64, no. 13, abs. no. B38.00006, 1 p.

Murakami, M., Bakhshian, S., and Hosseini, S., 2019, A high performance lattice Boltzmann solver with applications to multiphase flow in porous media (ext. abs.): TACCSTER 2019 Proceedings, http://doi.org/10.26153/tsw/6851.