

Seyyed Abolfazl. Hosseini

Professional Summary

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Professional Preparation

Academic Background

Ph.D. Petroleum Engineering, University of Tulsa, Oklahoma, 2008

M.S. Chemical Engineering, Biotechnology, Sharif University of Technology, Tehran, Iran, 2005

B.S. Chemical Engineering, University of Isfahan, Isfahan, Iran, 2002

Professional Appointments

Senior Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (September 2021-Present)

Research Scientist, Bureau of Economic Geology, The University of Texas at Austin (October 2016-Present)

Fluid flow modeling in porous media, with focus on EOR and unconventional reservoirs.

Research Associate, Bureau of Economic Geology, The University of Texas at Austin (2010-September 2016)

Fluid flow modeling in porous media, with focus on EOR and unconventional reservoirs.

Postdoctoral Research Associate, Harold Vance Department of Petroleum Engineering, Texas A&M University (November 2009 - 2010). Investigating theory and application of diffusive time of flight for drainage volume calculations in tight gas reservoirs. Drainage volumes calculated by this approach is used to optimize the well placement in tight gas reservoirs to minimize the interference of the production wells. Developing a new Petrel plug-in (SWIFT) for upgridding of geological models into the simulation models.

Research Assistant, Department of Petroleum Engineering, University of Tulsa (December 2008 - November 2009). Developing a new technique for upgridding to preserve dynamic flow behavior of fine scale geomodels. Developing reservoir simulation and automatic history matching codes based on adjoint and Ensemble Kalman Filter (EnKF) methods for uncertainty analysis.

Reservoir Simulation Engineer, Kelkar and Associates Inc., Tulsa, Oklahoma (December 2008 - November 2009). Reservoir simulation and history matching for multiple reservoirs, clastic and carbonate reservoirs including black oil and compositional simulation. Structural and property modeling of 3D static geomodels followed by upscaling to simulation models. Developing a new method for upgridding of reservoir models and implementing the new method into a commercial Petrel plug-in (CONNECT).

Areas of Expertise

Areas of Expertise

Black oil and Compositional reservoir simulation

Black oil and compositional reservoir simulation, uncertainty analysis and history matching using commercial software packages

CO₂-EOR and sequestration analytical and numerical modeling

Computer skills: Simulation software--Geoquest (Eclipse, PVTi), CMG (IMEX GEM), PipeSim, HYSYS; Modeling software--Petrel, RMS; Programming software--MATLAB, FORTRAN, Visual-Basic, C#, Delphi

History matching and inverse problem

Lost gas estimation and gas fractionation in unconventional formations

Multiphase fluid flow modeling in conventional and unconventional settings

Pressure transient analysis applications in CO₂-EOR fields for characterization and monitoring

Shale gas fluid flow modeling

Upscaling and upgridding of geological models to simulation models

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

Best paper award at 2013 COMSOL Conference, Boston, MA, October 2013-October 2013

Career-Development Publications Award, awarded by the GAAC, BEG, 2011

Exceptional Talented Students Ph.D. scholarship, 2006-2008

Best Paper Award, 9th Iranian National Chemical Engineering Congress, Tehran, Iran, 2005

Ranked 4th in Nationwide Chemical Engineering-Biotechnology M.S. Exam among more than 4000 participants, 2003

Top chemical engineering undergraduate student award, University of Isfahan, Iran, 2002

Service

External Committees Participation

Member, Editorial Board Committee, Bureau of Economic Geology, April 1, 2019-Present

Director, Carbon Capture and Storage Section, Society of Petroleum Engineers, October 1, 2018-Present

Committee Member, SWNA Region Award Selection Committee, Society of Petroleum Engineers, March 1, 2018-Present

Member, Society of Petroleum Engineers Opinion Panel, Society of Petroleum Engineers, June 1, 2013-Present

Member, PhD dissertation committee, Sayantan Bhowmik, Petroleum Engineering (expected 2014), January, 2013 - present

Member, Grants, Appointments. & Awards Committee, BEG, February 2013-February 2016

Chair, Risk Assessment and Monitoring Techniques for Geological CO₂ Sequestration (sessions I, II, and III), American Geophysical Union Fall Meeting, San Francisco, December 14-18, 2015

Co-Chair, Geological CO₂ Storage Monitoring From Injection Zone to Vadose Zone: Characterization, Detection Methods, and Field Applications, American Geophysical Union Fall Meeting, , San Francisco, California, December, 2012

Co-Chair, Geological CO₂ Storage Monitoring From Injection Zone to Vadose Zone: Characterization, Detection Methods, and Field Applications, GSA Annual Meeting and Exposition, , Charlotte, North Carolina, November, 2012

Proposal Review Panels Participation

Computational Geosciences (Article), 2013

Greenhouse Gases: Science and Technology (Article), 2013

Journal of Fuel (Article), 2013

Journal of Petroleum Science and Engineering (Article), 2013

SPE Journal (Article), 2013

AIChE Journal (Article), 2012

Computational Geosciences (Article), 2012

Journal of Petroleum Science and Engineering (Article), 2012

Journal of Porous Media (Article), 2012

SPE Reservoir Evaluation & Engineering-Formation Evaluation (Article), 2012

Teaching and Advising

University Courses Taught

Applied Subsurface Geology: University of Texas at Austin, May 1-15, 2015.

Continuing Education Courses Taught

Class VI Reservoir Modeling Considerations: presented to Louisiana Department of Natural Resources, online workshop, November 10, 2020.

Geologic Storage of CO₂ in Saline Aquifers: presented to The Clean Energies Department in Mexico's Energy Ministry (SENER), presented at Specialized CCUS capacity development workshop, National Autonomous University of Mexico (UNAM), April 24-28, 2017.

CO₂ storage and enhanced oil recovery: presented at AAPG Southwest Section, Fort Worth, Texas, May 23, 2012.

Student Committee Supervision

Graduate Assistant, Master's, Dissertation Committee, Shadya Taleb Restrepo, The University of Texas at Austin, 2021

Student Committee Participation

Member, Ph.D., Dissertation Committee, Reza Ershadnia, Understanding of Methane Fate and Transport in Groundwater, Department of Geology, University of Cincinnati, Cincinnati, Ohio, 2022

Member, Ph.D., Dissertation Committee, Pooneh Hosseininoosheri, CO₂ Trapping Mechanisms Assessment Using Numerical and Analytical Methods, Department of Civil, Architectural, and Environmental Engineering, Cockrell School of Engineering, The University of Texas at Austin, Austin, Tex., 2020

Member, Ph.D. dissertation committee, Hojung Jung, Analyses of Coupled Thermo-Chemo-Mechanical Processes for Safe Carbon Geological Storage, The University of Texas at Austin, Petroleum Engineering, 2017

Member, Ph.D. Dissertation Committee, Sayantan Bhowmik, Particle Tracking Proxies for Prediction of CO₂ Plume Migration Within a Model Selection Framework, University of Texas at Austin, Petroleum Engineering, 2013

Presentations

Invited Presentations

A Proposed 4-Phase Workflow for Defining Permit-Ready Locations for Large-Volume CO₂ Injection and Storage: presented to American Geophysical Union, presented at AGU 2024 Conference, Washington, DC, December 11, 2024.

Low Carbon Strategies and Future IOR Opportunities (plenary): presented to Society of Petroleum Engineers, presented at Improved Oil Recovery Symposium, Tulsa, Okla., August 31, 2020.

EASiTool for storage capacity estimation: presented at 2nd International Workshop on Offshore CO₂ Geologic Storage, Beaumont, Tex., June 19-20, 2017.

Application of pressure transient analysis for leakage detection: presented to United States Geological Survey, Reston, VA, July 20-21, 2016.

Diffusivity tomography with harmonically modulated pressure signals to detect CO₂ leakage in above zone monitoring interval: presented at Combined Meeting of the IEAGHG Modelling and Monitoring Networks, Edinburgh, Scotland, July 6-8, 2016.

Presentations

Application of machine learning for fast prediction of CO₂ plume and pressure buildup in geological CO₂ storage: presented at GeoGulf 2021, Austin, October 27-29, 2021.

Pressure Crosscutting Working Group Ppdate in Machine Learning Applications for SMART Initiative: presented to U.S. Department of Energy, presented at SMART Annual Review, online workshop, November 2-3, 2020.

Hydrogeological Modeling and Pore Pressure Characterization of Delaware Mountain Group in the Delaware Basin, Texas and New Mexico, abstract no. H51L-1640: presented to American Geophysical Union, December 9-13, 2019.

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.

The U.S. Gas Flooding Experience: CO₂ Injection Strategies and Impact on Ultimate Recovery: presented at 38th annual workshop and symposium on EOR, Riviera Maya, Mexico, September 26-30, 2017.

Enhanced Analytical Simulation Tool for CO₂ Storage Capacity Estimation: presented at Carbon Storage and Oil and Natural Gas Technologies Review Meeting, Pittsburgh, Pa., August 16-18, 2016.

Cranfield Project, Southeast Regional Carbon Sequestration Partnership: presented to U.S. Department of Energy, presented at Carbon Storage R&D Project Review Meeting, Pittsburgh, PA, August 18-20, 2015.

Enhanced Analytical Simulation Tool for CO₂ Storage Capacity Estimation and Uncertainty Quantification: presented to U.S. Department of Energy, presented at Carbon Storage R&D Project Review Meeting, Pittsburgh, PA, August 18-20, 2015.

Pressure Monitoring, Field Observations and Interpretation Challenges: presented at IEAGHG 10th Monitoring Network Meeting, Lawrence Berkeley National Laboratory, Berkeley, CA, June 10-12, 2015.

Enhanced Analytical Simulation Tool (EASiTool) for CO₂ Storage Capacity Estimation and Uncertainty Quantification: presented to U.S. Department of Energy, presented at 2014 Carbon Storage Review Meeting, Pittsburgh, PA, August 12-14, 2014.

Pressure Transient Analysis for Monitoring of CO₂ Leakage in Brine Aquifers: presented to the International Society for Porous Media, presented at 6th International Conference on Porous Media, Milwaukee, WI, May 27-30, 2014.

Site characterization and reservoir history matching for geological CO₂ sequestration at the S3 site: presented at 11th Annual Carbon Capture, Utilization, and Sequestration Conference, Pittsburgh, Pennsylvania, May 2, 2012.

Temperature monitoring at SECARB Cranfield Phase 3 site using distributed temperature sensing (DTS) technology: poster presented at 11th Annual Carbon Capture, Utilization, and Sequestration Conference, Pittsburgh, Pennsylvania, May 1, 2012.

Site characterization and history matching for S3 site: presented at Conference on Carbon Capture and Sequestration, Pittsburgh, Pennsylvania, April 1-3, 2012.

Analytical studies of brine reinjection during CO₂ sequestration in deep aquifers: poster presented at Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Analytical studies of brine reinjection during CO₂ sequestration in deep aquifers: poster presented at Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Carbon dioxide sequestration at Cranfield--analysis of injection and observation well fluid pressure, temperature and density measurements: poster presented at Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Carbon dioxide sequestration at Cranfield--analysis of injection and observation well fluid pressure, temperature and density measurements: presented at Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Modeling EOR oil production without an oil phase in the context of CCS: step-by-step conversion from a 3-phase system to a 2-phase CO₂-brine system: poster presented at

Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Modeling EOR oil production without an oil phase in the context of CCS: step-by-step conversion from a 3-phase system to a 2-Phase CO₂-brine system: poster presented at Conference on Carbon Capture and Sequestration, CCS Impact on Water Resources, Pittsburgh, Pennsylvania, May 2-5, 2011.

Cranfield phase III modeling: presented at the 6th Annual Southeast Regional Carbon Sequestration Partnership Stakeholders Briefing, Atlanta, Georgia, March 2011.

Cranfield phase III modeling: presented at the 6th Annual Southeast Regional Carbon Sequestration Partnership Stakeholders Briefing, Atlanta, Georgia, March 2011.

Gas cap impact on CO₂ plume migration for long-term storage in saline aquifers: presented at the 60th Gulf Coast Association of Geological Societies Annual Meeting, San Antonio, Texas, October 2010.

Gas cap impact on CO₂ plume migration for long-term storage in saline aquifers: presented at the 60th Gulf Coast Association of Geological Societies Annual Meeting, San Antonio, Texas, October 2010.

Activities of a Professional Nature

Professional Societies

American Geophysical Union

International Society for Environmental Information Sciences

International Society for Porous Media

Phi Kappa Phi

Society of Petroleum Engineers

Young Professional in Energy

Funding

Research Support

Co-Principal Investigator: SECARB USA regional CO₂ storage project (October 1, 2019-September 30, 2024; \$949,958).

Principal Investigator: Science-Informed Machine Learning to Accelerate Real-time (SMART) Decisions in Subsurface Applications Phase 2 - Development and Field Validation, U.S. Department of Energy (March 1, 2023-June 31, 2024; \$451,000).

Co-Principal Investigator: Demonstration of proof of concept of a multi-physics approach for near-real-time remote monitoring of dynamic changes in pressure and salinity in hydraulically fractured networks, Department of Energy (October 1, 2019-September 31, 2021; \$1,470,566).

Principal Investigator: Developing Machine Learning Workflows for Rapid Forecasting in Subsurface Science, U.S. Department of Energy (January 7, 2020-August 31, 2021; \$350,000).

Principal Investigator: State of Induced Seismicity in CCS Projects, IEAGHG: IEA Greenhouse Gas R&D Programme (April 1-October 31, 2020; \$89,000).

Co-Principal Investigator: USGS-GCCC co-op research project, USGS (April 27, 2017-April 27, 2019; \$150,000).

Co-Principal Investigator: Headspace Gas Monitoring to Infer Dissolved Gas Concentrations, Australian National Low Emission Coal Research and Development (February 20, 2018-February 19, 2019; \$314,937).

Co-Principal Investigator: Pressure-Based Inversion and Data Assimilation System (PIDAS) for CO₂ Leakage Detection, Department of Energy (January 2014-December 2017; \$971,914).

Co-Principal Investigator: USGS-GCCC co-op research project, USGS (April 27, 2016-April 28, 2017; \$50,000).

Principal Investigator: Enhanced Analytical Simulation Tool for CO₂ Storage Capacity Estimation and Uncertainty Quantification, Department of Energy (April 2013-April 2017; \$999,340).

Co-Principal Investigator: Demonstration of de-facto CO₂ storage at a CO₂-EOR site, SECARB Early Test site, MS, JIP CCP4 (November 1, 2015-October 31, 2016; \$120,374).

Principal Investigator: Pressure management and plume control strategies through a brine extraction storage test at the Devine Test Site in Texas, Department of Energy (September 1, 2015-August 31, 2016; \$1,865,038).

Publications

Peer Reviewed Authored Books

Hosseini, S. A., Hovorka, S. D., Savvaidis, A., Kavoura, F., and Nicot, J.-P., 2022, Current state of knowledge regarding the risk of induced seismicity at CO₂ storage projects: Cheltenham, UK, IEA Environmental Projects Ltd., IEAGHG Technical Report, v. 2022-02, 63 p.

Peer Reviewed Journal Articles

Ershadnia, R., Moeini, F., Hosseini, S. A., Dai, Z., and Soltanian, M. R., 2024, Predicting multiphase flow behavior of methane in shallow unconfined aquifers using conditional deep convolutional generative adversarial network: *Journal of Hydrology*, v. 641, no. 131674, 15 p., <http://doi.org/10.1016/j.jhydrol.2024.131674>.

Fan, M., Wang, H., Zhang, J., Hosseini, S. A., and Lu, D., 2024, Advancing spatiotemporal forecasts of CO₂ plume migration using deep learning networks with transfer learning and interpretation analysis: *International Journal of Greenhouse Gas Control*, v. 132, no. 104061, 15 p., <http://doi.org/10.1016/j.ijggc.2024.104061>.

Hosseini, S. A., Ershadnia, R., Lun, L., Morgan, S., Bennet, M., Skrivanos, C., Li, B., Soltanian, M. R., Pawar, R., and Hovorka, S. D., 2024, Dynamic modeling of geological carbon storage in aquifers-workflows and practices: *International Journal of Greenhouse Gas Control*, v. 138, no. 104235, 18 p., <http://doi.org/10.1016/j.ijggc.2024.104235>.

Leng, J., Bump, A., Hosseini, S. A., Meckel, T. A., Wang, Z., and Wang, H., 2024, A comprehensive review of efficient capacity estimation for large-scale CO₂ geological storage: *Gas Science and Engineering*, v. 126, no. 205339, 19 p., <http://doi.org/10.1016/j.gjsce.2024.205339>.

Ramadhan, R., Promneewat, K., Thanasaksukthawee, V., Tosuai, T., Babaei, M., Hosseini, S. A., Puttiwongrak, A., Leelasukseree, C., and Tangparitkul, S., 2024, Geomechanics contribution to CO₂ storage containment and trapping mechanisms in tight sandstone complexes: a case study on Mae Moh Basin: *Science of The Total Environment*, v. 928, no. 172326, 13 p., <http://doi.org/10.1016/j.scitotenv.2024.172326>.

Treviño, R. H., Hovorka, S. D., Dunlap, D. B., Larson, R. C., Hentz, T. F., Hosseini, S. A., Bhattacharya, S., and DeAngelo, M. V., 2024, A phased workflow to define permit-ready locations for large volume CO₂ injection and storage: *Greenhouse Gases Science and Technology*, v. 14, no. 1, p. 95-110, <http://doi.org/10.1002/ghg.2253>.

Wang, H., Guo, R., Dalton, L. E., Crandall, D., Hosseini, S. A., Fan, M., and Chen, C., 2024, Comparative assessment of U-Net-based deep learning models for segmenting microfractures and pore spaces in digital rocks: *SPE Journal*, v. 29, no. 11, p. 5779-5791, <http://doi.org/10.2118/215117-PA>.

Wang, H., Hosseini, S. A., Tartakovsky, A. M., Leng, J., and Fan, M., 2024, A deep learning-based workflow for fast prediction of 3D state variables in geological carbon storage: a dimension reduction approach: *Journal of Hydrology*, v. 636, no. 131219, 18 p., <http://doi.org/10.1016/j.jhydrol.2024.131219>.

Wang, Z. W., Peng, C., Ayala, L. F., and Hosseini, S. A., 2024, A framework for simulating the partially miscible multi-component hydrocarbon fluids in porous media via the pseudo-potential lattice Boltzmann model: *InterPore Journal*, v. 1, no. 1, 21 p., <http://doi.org/10.69631/ipj.v1i1nr7>.

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>.

Ershadnia, R., Singh, M., Mahmoodpour, S., Meyal, A., Moeini, F., Hosseini, S. A., Sturmer, D. M., Rasoulzadeh, M., Dai, Z., and Soltanian, M. R., 2023, Impact of geological and operational conditions on underground hydrogen storage: *International Journal of Hydrogen Energy*, v. 48, no. 4, p. 1450-1471, <http://doi.org/10.1016/j.ijhydene.2022.09.208>.

Ershadnia, R., Wallace, C. D., Hajirezaie, S., Hosseini, S. A., Nguyen, T. N., Sturmer, D. M., Dai, Z., and Soltanian, M. R., 2022, Hydro-thermo-chemo-mechanical modeling of carbon dioxide injection in fluvial heterogeneous aquifers: *Chemical Engineering Journal*, v. 431, no. 133451, 23 p., <http://doi.org/10.1016/j.cej.2021.133451>.

Ershadnia, R., Wallace, C. D., Hajirezaie, S., Hosseini, S. A., Nguyen, T. N., Sturmer, D. M., Dai, Z., and Soltanian, M. R., 2022, Hydro-thermo-chemo-mechanical modeling of carbon dioxide injection in fluvial heterogeneous aquifers: *Chemical Engineering Journal*, v. 431, no. 4, article no. 133451, 23 p., <http://doi.org/10.1016/j.cej.2021.133451>.

Ge, J., Nicot, J.-P., Hennings, P. H., Smye, K. M., Hosseini, S. A., Gao, R. S., and Breton, C. L., 2022, Recent water disposal and pore pressure evolution in the Delaware Mountain Group, Delaware Basin, Southeast New Mexico and West Texas, USA: *Journal of Hydrology: Regional Studies*, v. 40, no. 101041, 17 p., <http://doi.org/10.1016/j.ejrh.2022.101041>.

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>.

Ershadnia, R., Hajirezaie, S., Amooie, A., Wallace, C. D., Gershenzon, N. I., Hosseini, S. A., Sturmer, D. M., Ritzi, R. W., and Soltanian, M. R., 2021, CO₂ geological sequestration in multiscale heterogeneous aquifers: effects of heterogeneity, connectivity, impurity, and hysteresis: *Advances in Water Resources*, v. 151, no. 103895, 16 p., <http://doi.org/10.1016/j.advwatres.2021.103895>.

Ershadnia, R., Hajirezaie, S., Amooie, A., Wallace, C. D., Gershenzon, N. I., Hosseini, S. A., Sturmer, D. M., Ritzi, R. W., and Soltanian, M. R., 2021, CO₂ geological sequestration in multiscale heterogeneous aquifers: effects of heterogeneity, connectivity, impurity, and hysteresis: *Advances in Water Resources*, v. 151, no. 103895, 16 p., <http://doi.org/https://doi.org/10.1016/j.advwatres.2021.103895>.

Ershadnia, R., Wallace, C. D., Hosseini, S. A., Dai, Z., and Soltanian, M. R., 2021, Capillary heterogeneity linked to methane lateral migration in shallow unconfined aquifers: *Geophysical Research Letters*, v. 48, no. 23, article no. e2021GL095685, 12 p., <http://doi.org/10.1029/2021GL095685>.

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>.

Shokouhi, P., Kumar, V., Prathipati, S., Hosseini, S. A., Giles, C. L., and Kifer, D., 2021,

Physics-informed deep learning for prediction of CO₂ storage site response: *Journal of Contaminant Hydrology*, v. 241, no. 103835, 13 p., <http://doi.org/10.1016/j.jconhyd.2021.103835>.

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>.

Jung, H., Espinoza, D. N., and Hosseini, S. A., 2020, Wellbore injectivity response to step-rate CO₂ injection: coupled thermo-poro-elastic analysis in a vertically heterogeneous formation: *International Journal of Greenhouse Gas Control*, v. 102, no. 103156, 10 p., <http://doi.org/10.1016/j.ijggc.2020.103156>.

Mehana, M., Hosseini, S. A., Meckel, T. A., and Viswanathan, H., 2020, Modeling CO₂ plume migration using an invasion-percolation approach that includes dissolution: *Greenhouse Gases: Science and Technology*, v. 10, no. 2, p. 283-295, <http://doi.org/10.1002/ghg.1976>.

Zhou, Q., Yang, X., Zhang, R., Hosseini, S. A., Ajo-Franklin, J. B., Freifeld, B. M., Daley, T. M., and Hovorka, S. D., 2020, Dynamic processes of CO₂ storage in the field: 1. multiscale and multipath channeling of CO₂ flow in the hierarchical fluvial reservoir at Cranfield, Mississippi: *Water Resources Research*, v. 56, no. e2019EF001360, 30 p., <http://doi.org/10.1029/2019WR025688>.

Alfi, M., Hosseini, S. A., Enriquez, D., and Zhang, T., 2019, A new technique for permeability calculation of core samples from unconventional gas reservoirs: *Fuel*, v. 235, p. 301-305, <http://doi.org/10.1016/j.fuel.2018.07.114>.

Alfi, M., Vasco, D. W., Hosseini, S. A., Meckel, T., and Hovorka, S. D., 2019, Validating compositional fluid flow simulations using 4D seismic interpretation and vice versa in the SECARB Early Test--a critical review: *International Journal of Greenhouse Gas Control*, v. 82, p. 162-174, <http://doi.org/10.1016/j.ijggc.2019.01.003>.

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>.

Goudarzi, A., Meckel, T., Hosseini, S. A., and Treviño, R. H., 2019, Statistical analysis of historic hydrocarbon production data from Gulf of Mexico oil and gas fields and application to dynamic

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