Pennsylvania State University
Department of Energy and Mineral Engineering
102 Hosler Building, University Park, PA 16802
(+1) 814-865-6892 | amin.mehrabian@psu.edu

Amin Mehrabian

Professional Experience
- Assistant Professor, Pennsylvania State University, Fall 2017 – Present.
- Principal R&D Engineer, Halliburton Energy Services, October 2013 – September 2017.
- Postdoctoral Research Associate, University of Oklahoma, May 2013 – October 2013.

Education
- PhD, Petroleum Engineering, University of Oklahoma, 2013.
- MSc, Mechanical Engineering, Sharif University of Technology, 2006.
- BSc, Petroleum Engineering, Sharif University of Technology, 2005.
- BSc, Mechanical Engineering, Sharif University of Technology, 2004.

Research Interest
- Mechanics and physics of porous media.
- Subsurface geomechanics.
- Drilling and completion operations.

Teaching
- Drilling Engineering, PNG 450, Undergraduate level
- Drilling Engineering Laboratory, PNG 451, Undergraduate level
- Coupled Flow and Deformation in Porous Media, PNG 502, Graduate level

Patents
1. A. Mehrabian, W. Zhang, P. Khodaparast, 2022, Benchtop rig hydraulics similitude, International Patent (PCT) Application 63/202,112.
2. A. Mehrabian, S.G. Teodorescu, D.E. Jamison, 2018, Closed-loop managed pressure drilling with hydraulic modeling that incorporates an inverse model, US Patent Grant 9909374.

Book Chapters
1. A. Mehrabian, V. Nguyen, Y. Abousleiman, 2019, Wellbore mechanics and stability in shale, In: *Subsurface Science and Engineering of Shale*, Edited by: T. Dewers, M. Sanchez, and J. Heath, American Geophysical Union (AGU) Books: Wiley and Sons.

Peer-Reviewed Journal Publications
1. X. Su*, A. Mehrabian, 2022, The poroviscoelastodynamic solution to Mandel's problem, *Journal of Sound and Vibration*, 530, 116987-
2. X. Su*, A. Mehrabian, 2022, The viscoelastic solution to Geertsma's subsidence problem, *Journal of Applied Mechanics*, 89(5), 051009.

* PhD research student advisee

3. K. Nguyen*, A. Mehrabian, A. Santra, D. Phan, 2022, Tensile failure and fracture width of partially permeable wellbores with applications in lost circulation material design, *Society of Petroleum Engineers Journal*, 27(01), 465-487.
4. W. Zhang*, A. Mehrabian, 2021, Nonlinear and non-local analytical solution for Darcy–Forchheimer flow through a deformable porous inclusion within a semi-infinite elastic medium, *Journal of Fluid Mechanics*, 911, A49.
5. X. Su*, A. Mehrabian, 2021, Coupled poroelastic solutions for the reservoir and caprock layers with the overburden confinement effects, *Geomechanics for Energy and the Environment*, 25, 100215.
6. W. Zhang*, A. Mehrabian, 2021, Dimensionless solutions for the time-dependent and rate-dependent productivity index of wells in deformable reservoirs, *Society of Petroleum Engineers Journal*, 26(05), 2814-2836.
7. K. Nguyen*, A, Mehrabian, 2021, Method of images solution for an edge dislocation and a circular cavity in crystalline solids, *Physical Mesomechanics*, 24 (1), 20-31.
8. W. Zhang*, P. Khodaparast, A. Mehrabian, A. Shojaei, 2021, Scale model equations and optimization for annular flow of non-Newtonian fluids between eccentric and rotating cylinders, *Progress in Scale Modeling, an International Journal*, 2(1), 2.
9. A. Mehrabian, C. Liu, 2021, Mandel's problem reloaded, *Journal of Sound and Vibration*, 492, 115785.
10. W. Zhang*, A. Mehrabian, 2020, Poroelastic solution for the nonlinear injectivity of subsurface rocks with strain-induced permeability variations, *Water Resources Research*, 56(08), e2020WR027620.
11. W. Zhang*, A. Mehrabian, 2020, Poroelastic analytical solution for the nonlinear productivity index of wells in stress-sensitive reservoir rocks, *Society of Petroleum Engineers Journal*, 26(1), 68-82.
12. A. Mehrabian, Y. Abousleiman, 2019, Poroelastic Solution to the Brazilian Test, *International Journal of Rock Mechanics and Mining Sciences*, 126, 104201.
13. A. Mehrabian, A.D. Perez, C. Santana, 2018, Wellbore stability analysis considering the weak bedding planes effect - a case study, *Society of Petroleum Engineers Drilling & Completion*, 33(4), 377-384.
14. A. Mehrabian, 2018, The poroelastic constants of multiple-porosity solids, *International Journal of Engineering Science*, 132, 97-104.
15. C. Liu, A. Mehrabian, Y. Abousleiman, 2018, Theory and analytical solutions to coupled processes of transport and deformation in dual-porosity dual-permeability poro-chemo-electro-elastic media, *Journal of Applied Mechanics*, 85(11), 111006-111018.
16. A. Mehrabian, Y.N. Abousleiman, 2018, Theory and analytical solution to Cryer's problem of N-porosity and N-permeability poroelasticity, *Journal of the Mechanics and Physics of Solids*, 118, 218-227.
17. C. Liu, A. Mehrabian, Y.N. Abousleiman, 2018, Poroelastic dual-porosity/dual-permeability after-closure pressure-curves analysis in hydraulic fracturing, *Society of Petroleum Engineers Journal*, 22 (01), 198-218.
18. A. Mehrabian, Y.N. Abousleiman, 2017, Letter to the Editor regarding "A fully dynamic multi-compartmental poroelastic system: Application to aqueductal stenosis", by D. Chou, JC Vardakis, L. Guo, BJ Tully, and Y. Ventikos, *Journal of Biomechanics*, 58, 241-242.
19. A. Mehrabian, Y.N. Abousleiman, 2017, Wellbore geomechanics of extended drilling margin and engineered lost circulation solutions, *Society of Petroleum Engineers Journal*, 22(04), 1178-1188.
20. A. Mehrabian, 2016, The stability of inclined and fractured wellbores, *Society of Petroleum Engineers Journal*, 21(05), 1518-1536.
21. A. Mehrabian, Y.N. Abousleiman, 2015, Gassmann equations and the constitutive relations for multiple-porosity and multiple-permeability poroelasticity with applications to oil and gas shale,

International Journal for Numerical and Analytical Methods in Geomechanics, Poromechanics Special Issue, 39(14), 1547-1569.

22. A. Mehrabian, D.E. Jamison, S.G. Teodorescu, 2015, Geomechanics of lost-circulation events and wellbore strengthening operations, *Society of Petroleum Engineers Journal*, 20(6), 1305-1318.
23. A. Mehrabian, Y.N. Abousleiman, 2015, Geertsma's subsidence solution extended to layered stratigraphy, *Journal of Petroleum Science and Engineering*, 130, 68-76.
24. A. Mehrabian, Y.N. Abousleiman, T.B. Mapstone, C.A. El-Amm, 2015, Dual-porosity poroviscoelasticity and quantitative hydromechanical characterization of the brain tissue with experimental hydrocephalus data, *Journal of Theoretical Biology*, 384, 19-32.
25. A. Mehrabian, Y.N. Abousleiman, 2014, Generalized Biot's theory and Mandel's problem of multiple-porosity and multiple-permeability poroelasticity, *Journal of Geophysical Research: Solid Earth*, 119 (4), 2745-2763.
26. A. Mehrabian, Y.N. Abousleiman, 2013, Generalized poroelastic wellbore problem, *International Journal for Numerical and Analytical Methods in Geomechanics*, 37(6), 2727-2754.
27. A. Mehrabian, Y.N. Abousleiman, 2011, General solutions to poroviscoelastic model of human brain tissue, *Journal of Theoretical Biology*, 291(6), 105-118.
28. A. Mehrabian, F. Crespo, 2011, A new multi-sample EOS model for the gas condensate phase behavior analysis, *Oil & Gas Science and Technology–Revue d'IFP Energies Nouvelles*, 66(6), 1025-1033.
29. A. Mehrabian, Y.N. Abousleiman, 2009, The dilative intake of poroelastic inclusions an alternative to Mandel-Cryer effect, *Acta Geotechnica*, 4(4), 249-259.
30. M.T. Ahmadian, A. Mehrabian, 2006, Design optimization by numerical characterization of fluid flow through the valveless diffuser type micropumps, *Journal of Physics, Conf. Series*, 34, 379-384.

Proceedings Publications

1. X. Su[*], K. Nguyen[*], 2022, Wellbore survey and drilling margin optimization for in-situ stress change and rotation around depleted reservoirs, *SPE Annual Technical Conference and Exhibition*, October 3-5, Houston, Texas.
2. W. Zhang[*], A. Mehrabian, Geomechanics of CO_2 huff-n-puff in shale: the impacts on natural gas recovery and CO_2 storage capacity, 2022, *SPE Annual Technical Conference and Exhibition*, October 3-5, Houston, Texas.
3. K. Nguyen[*], A. Mehrabian, A. Santra, D. Phan, 2022, Lost circulation material design for engineered fracture gradient of drilling, *SPE Annual Technical Conference and Exhibition*, October 3- 5, Houston, Texas.
4. T. Nosar[***], P. Khodaparast, W. Zhang[*], A. Mehrabian, 2021, Scaling formulae for the wellbore hydraulics similitude with drill pipe rotation and eccentricity, *SPE Middle East Oil & Gas Show and Conference*, May 24-27, Sanabis, Bahrain.
5. K. Nguyen[*], A. Mehrabian, A. Santra, D. Phan, 2021, Lost circulation material design for inclined and partially sealed wellbores, *SPE Middle East Oil & Gas Show and Conference*, May 24-27, Sanabis, Bahrain.
6. K. Nguyen[*], A. Mehrabian, 2020, A. Santra, Multi-modal particle size distribution of lost circulation material blend for controlling fluid losses from multiple fractures around inclined wellbores, *SPE Asia Pacific Oil & Gas Conference and Exhibition*, November 17-19, Virtual.

[***] Undergraduate research student advisee

7. W. Zhang*, A. Mehrabian, 2019, Poroelastic solution to the nonlinear productivity index of stress-sensitive reservoir rocks, *SPE Annual Technical Conference and Exhibition*, Calgary, Alberta, Canada Sep 29 – Oct 02.
8. A. Mehrabian, A.D. Perez, and C. Santana, 2018, Wellbore stability solution incorporating the weak bedding planes effect with field case study, *IADC/SPE Drilling Conference and Exhibition*, 6-8 March, Fort Worth, Texas, USA.
9. A. Mehrabian, S. Savari, D. Whitfill, Y. Abousleiman, 2017, Geomechanics of wellbore strengthening revisited: A combined theoretical and experimental approach with field case studies, *2017 IADC/SPE Drilling Conference and Exhibition*, 14-16 March, Amsterdam, Netherlands.
10. A. Mehrabian, Y.N. Abousleiman, 2017, Multiple-porosity and multiple-permeability: Theory and benchmark analytical solution, *6th Biot Conference on Poromechanics*, Paris, France, July 9-13.
11. A. Mehrabian, Y. Abousleiman, 2016, Wellbore geomechanics of extended drilling margins and engineered lost circulation solutions, *50th US Rock Mechanics/Geomechanics Symposium*, Houston TX, 26-29 June.
12. A. Mehrabian, Y. Abousleiman, 2012, Realizations of experimental hydrocephalus data through the analytical model of poroviscoelastic brain tissue, SBC2012-80192, *ASME Summer Bioengineering Conference*, Fajardo, Puerto Rico, June 20-23.
13. M.T. Ahmadian, A. Mehrabian, 2006, A new model for dynamic analysis of side mounted diffuser valve micropumps, ESDA2006-95038, ASME *8th Biennial Conference on Engineering Systems Design and Analysis*, Torino, Italy, July 4-7**.**
14. M.T. Ahmadian, M. H. Saidi, Amin Mehrabian, M. Bazargan, S. D. Kenarsari, 2006, Performance of valveless diffuser micropumps under harmonic piezoelectric actuation, ESDA2006-95281, *ASME 8th Biennial Conference on Engineering Systems Design and Analysis*, Torino, Italy, July 4-7**.**
15. A. Mehrabian, M. T. Ahmadian, Effect of actuation frequency on the performance of diffuser micropumps, ICNMM2006-96008, *ASME 4th Conference on Micro, Mini and Nano-Channels*, Limerick, Ireland, June 19-21.
16. M. H. Saidi, A. Mehrabian, 2005, Analysis of two-phase flow across a normal shock wave with drift velocity effects, *IIR International Conference on Refrigeration*, 703-711, Vicenza, Italy, August 30-31.

Invited Talks

1. W. Zhang, A. Mehrabian, 2021, Dimensionless solutions for the time-dependent and rate-dependent productivity index of wells in deformable reservoirs, *Society of Petroleum Engineers Reservoir Simulation Conference*, Oct 4-6, Galveston, Texas.
2. W. Zhang, A. Mehrabian, 2021, The rate-dependent productivity index of wells in stress-sensitive reservoirs, Petroleum Engineering Department Heads Association, Virtual.
3. Mehrabian, A., 2019, Poroelastic solution to the Brazilian test, J. L. Corky Frank 58 Graduate Seminar Series, Texas A&M University, College Station, Texas.
4. Mehrabian, A., 2018, Engineered fracture gradient of drilling, Aramco Services Company, Houston.

Conference Presentations

1. W. Zhang*, A. Mehrabian, 2022, Full coupling of CO_2-CH_4 diffusion and sorption with solid deformation in gas shale enhances natural gas recovery and geological CO_2 storage capacity, *Engineering Mechanics Institute Conference***,** John Hopkins University, May 31, June 3.

2. X. Su*, A. Mehrabian, 2020, Coupled poroelastic solutions for the reservoir and caprock layers with the overburden confinement effects, *American Geophysical Union Fall Meeting*, Virtual, Dec 1-17.
3. W. Zhang*, A. Mehrabian, 2019, Poroelastic solution to the nonlinear productivity index of stress-sensitive reservoir rocks, *Engineering Mechanics Institute Conference*, CalTech, Pasadena, CA, June 18-21.
4. A. Mehrabian, Y. Abousleiman, 2019, Poroelastic solution to the generalized Brazilian test, *Engineering Mechanics Institute Conference*, CalTech, Pasadena, CA, June 18-21.
5. A. Mehrabian, 2018, Geertsma's subsidence solution extended to layered stratigraphy, *Engineering Mechanics Institute Conference*, MIT, Massachusetts, May 29- June 01.
6. A. Mehrabian, 2018, Multiple-porosity and multiple-permeability poroelasticity of organic-rich shale, *Engineering Mechanics Institute Conference*, MIT, Massachusetts, May 29- June 01.
7. A. Mehrabian, Y. Abousleiman, 2015, Dual-porosity and dual-permeability poroelastic integrity analysis of naturally fractured shale in CO2 sequestration operations, *Engineering Mechanics Institute Conference*, Stanford University, California, June 16-19.
8. A. Mehrabian, Y. Abousleiman, 2010, The poroviscoelastic response of brain tissues during ventriculostomy treatments, *IV European Conference on Computational Mechanics,* Palais des Congrès, Paris, May 16-21.

Research Student Advisees

- *Wei Zhang*, PhD, Graduated in May 2022.
- *Xing Su*, PhD, Completed the PhD comprehensive exam in May 2021.
- *Kien Nguyen*, PhD, Completed the PhD comprehensive exam in May 2021.
- *Yidi Wu*, PhD, Expected to complete the PhD qualifying exam in August 2022.
- *Thad Nosar*, BSc, Graduated in May 2021.
- *Mohammed Alarfaj*, BSc, Ongoing.

Service to the Profession and Society

- *Associate Editor*, Journal of Petroleum Exploration and Production Technology (Springer). April 2018 – April 2020.
- *MiniSymposium Chair* (MS 801), Geomechanics of Geological Carbon Storage and Enhanced Hydrocarbon Recovery, Engineering Mechanics Institute Conference (EMI 2022), John Hopkins University, Baltimore, Maryland, May 31–June 3, 2022.
- *Minisymposium Chair* (MS 205), Petroleum Geomechanics Problems, Engineering Mechanics Institute Conference (EMI 2021), Columbia University (virtual), May 26 – 28, 2021.
- *Session Chair*, Experimental and theoretical advancements in shale mechanics, American Geophysical Union Fall Meeting, Virtual, Dec 1–17, 2020.
- *Session Chair*, Experimental and Theoretical advances in shale, American Geophysical Union Fall Meeting, San Francisco, CA, Dec 9–13, 2019.
- *Minisymposium Chair* (MS 89), Analytical and numerical solutions to petroleum geomechanics problems, Engineering Mechanics Institute Conference (EMI 2018), MIT, Boston, Massachusetts, May 29 – June 2 2018.
- *Minisymposium Chair* (MS 104), Multiscale mechanics and physics of shale, Engineering Mechanics Institute Conference (EMI 2017), USC, San Diego, June 4–7, 2017.

- *Member,* Poromechanics Committee, Engineering Mechanics Institute (EMI) of the American Society of Civil Engineers, March 2015 – Present.
- *Technical Reviewer*: Philosophical Transactions of the Royal society of London - Advances in Water Resources - SPE Journal - Journal of Petroleum Science and Engineering - Journal of Engineering Mechanics - Rock Mechanics and Rock engineering - International Journal of Numerical and Analytical Methods in Geomechanics - International Journal for Rock Mechanics and Mining Sciences - Fuel - Journal of Petroleum Exploration and Production Technology - ASME Journal of Energy Resources Technology - Biot Conference on Poromechanics - American Rock Mechanics Association Conference.

Service to the University

- *Director,* Drilling Laboratory, Energy and Mineral Engineering Department, Pennsylvania State University, Fall 2017 – Present.
- *Faculty Advisor*, The student chapter of the American Association of Drilling Engineers (AADE), Pennsylvania State University, Fall 2017 – Present.
- *Faculty Advisor*, 3rd-year and 4th-year undergraduate students of the Petroleum and Natural Gas Engineering Program, Pennsylvania State University, Spring 2020 – Fall 2021.
- *Member*, Graduate Admissions Committee, Energy and Mineral Engineering Department, Pennsylvania State University, Fall 2021 – Present.
- *Member*, PhD Qualifying Exam Committee, Energy and Mineral Engineering Department, Pennsylvania State University, Summer 2022 – Present.
- *Judge*, Graduate Research Showcase, College of Earth and Mineral Sciences, Pennsylvania State University, Fall 2021.
- *Judge*, Graduate Poster Competition and Recognition, College of Earth and Mineral sciences, Pennsylvania State University, Fall 2019.

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