Fatemeh Pourahmadian

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Education

Ph.D. in Civil Engineering/Mechanics, 2011-2016
University of Minnesota, Twin Cities, MN
Cumulative GPA: 4.00/4.00
Thesis title: _A holistic approach to seismic waveform tomography of heterogeneous fractures:_
From geometric reconstruction to interfacial characterization
Advisor: Prof. Bojan B. Guzina, _Co-advisor_: Prof. Joe Labuz

M.Sc. in Geo-Engineering, 2015
University of Minnesota, Twin Cities, MN
Cumulative GPA: 4.00/4.00
Advisor: Prof. Bojan B. Guzina

M.Sc. in Mechanical Engineering, 2007-2010
Iran University of Science and Technology, Tehran, Iran
Cumulative GPA: 18.85/20.00
Thesis title: _Modeling and identification of nonlinear systems with internal resonance_
Advisor: Prof. Hamid Ahmadian, _Co-advisor_: Dr. Hassan Jalali

B.Sc. in Mechanical Engineering, 2003-2007
University of Tabriz, Tabriz, Iran
Cumulative GPA: 17.35/20.00
Thesis title: _FEM-based dynamic analysis of freight bogies under high-frequency wheel-rail excitation_
Advisor: Prof. Mohammad Zehsaz

Research and Professional Experience

Department of Civil, Environmental & Architectural Engineering, University of Colorado Boulder

2017–   Assistant Professor

keywords: multiscale and multiphysics remote sensing, laser-enabled in-situ diagnostics,
dynamics of material interfaces, multifunctional metamaterials,
deep learning approaches to inverse scattering and material design

Department of Applied Mathematics, University of Colorado Boulder

2019–   Affiliated Faculty

keywords: physics-based data analytics germane to uncertain or unknown environments,
multiscale homogenization, inverse problems, asymptotic analysis, deep learning

Department of Civil, Environmental & Geo- Engineering, University of Minnesota, Twin Cities

2016–2017   Postdoctoral Research Associate

2011–2016   Research Assistant

<u>*keywords*</u>: holistic approaches to waveform tomography and characterization of fractures, high-frequency inverse scattering, 3D acoustic and elastic wave propagation in fractured media

Department of Mechanical Engineering, Iran University of Science and Technology, Tehran
Experimental Modal Analysis Laboratory

2010–2011   Research Associate

2008–2010   Research Assistant

<u>*keywords*</u>: inverse problems in nonlinear dynamics, mechanics of frictional interfaces, nonlinear normal modes and their application to signal processing and system identification

Journal Publications

* highlights students advised and [†] indicates postdocs advised

J24. Francis N M*, Shin D, Lebensohn R, Pourahmadian F, Dingreville R (2025). "Micropolar Deep Material Network", *Journal of Computer Methods in Applied Mechanics and Engineering*, under review.

J23. Schmid A C*, Doostan A, Pourahmadian F (2024). "Ensemble WSINDy for data-driven discovery of governing equations from laser-based full-field measurements", *Journal of Mechanical Systems and Signal Processing*, under review (ArXiv preprint).

J22. Song J*, Pourahmadian F, Murray T W, Narumanchi V V* (2024). "Laser ultrasonic imaging via the time-domain linear sampling method", *IEEE Transactions on Computational Imaging*, under review (ArXiv preprint).

J21. Xu Y*, Pourahmadian F (2024). "Network scaling and dynamic loss balancing for intelligent poroelastography", *Computational Physics*, under revision (ArXiv preprint).

J20. Francis N M*, Lebensohn R, Pourahmadian F, Dingreville R (2024). "Micropolar elastoplasticity using a fast Fourier transform-based solver", *International Journal for Numerical Methods in Engineering*, **126**(1), e7651.

J19. Francis N M*, Pourahmadian F, Lebensohn R, Dingreville R (2024). "A fast Fourier transform-based solver for micropolar composites", *Journal of Computer Methods in Applied Mechanics and Engineering*, **418**, 116510.

J18. Xu Y*, Pourahmadian F, Song J*, Wang C* (2023). "Deep learning for full-field ultrasonic characterization", *Journal of Mechanical Systems and Signal Processing*, **201**, 110668.

J17. Narumanchi V V*, Pourahmadian F, Lum J, Townsend A, Tringe J W, Stobbe D M, Murray T W (2023). "Laser ultrasonic imaging of subsurface defects with the linear sampling method", *Optics Express*, **31**(5), $9098-9111$.

J16. Liu X*, Song J**, Pourahmadian F, Haddar H (2023). "Time- vs. frequency- domain inverse elastic scattering: Theory and experiment", *SIAM Journal on Applied Mathematics*, **83**(3), $1296-1314$.
* authors equally contributed to this work.

J15. Pourahmadian F, Haddar H (2023). "Ultrasonic imaging in highly heterogeneous backgrounds", *Proceedings of the Royal Society A*, **479**, 20220721.

J14. Pourahmadian F, Napal K† (2022). "Poroelastic near-field inverse scattering", *Journal of Computational Physics*, **455**, 111005.

J13. Pourahmadian F, Yue H* (2021). "Laboratory application of sampling approaches to inverse scattering", *Inverse Problems*, **37**, 055012.

J12. Pourahmadian F (2021). "Experimental validation of differential evolution indicators for ultrasonic imaging in unknown backgrounds", *Journal of Mechanical Systems and Signal Processing*, **161**, 108029.

J11. Pourahmadian F, Haddar H (2020). "Differential tomography of micromechanical evolution in elastic materials of unknown micro/macrostructure", *SIAM Journal on Imaging Sciences*, **13**(3), 1302−1330.

J10. De Teresa I, Pourahmadian F (2018). "Real-time imaging of interfacial damage in heterogeneous composites", *SIAM Journal on Applied Mathematics*, **78**(5), 763−2790.

J9. Pourahmadian F, Guzina BB (2018). "On the elastic anatomy of fractures in rock', *International Journal of Rock Mechanics and Mining Sciences*, **106**, 259−268.

J8. Pourahmadian F, Guzina BB, Haddar, H (2017). "A synoptic approach to the seismic sensing of heterogeneous fractures: from geometric reconstruction to interfacial characterization", *Computer Methods in Applied Mechanics and Engineering*, **324**, 395−412.

J7. Pourahmadian F, Guzina BB, Haddar, H (2017). "Generalized linear sampling method for elastic-wave sensing of heterogeneous fractures", *Inverse Problems*, **33**, 055007 (33pp).

J6. Pourahmadian F, Guzina BB (2015). "On the elastic-wave imaging and characterization of fractures with specific stiffness", *International Journal of Solids and Structures*, **71**, 126−140.

J5. Guzina BB, Pourahmadian F (2015). "Why the high-frequency inverse scattering by topological sensitivity may work", *Proceedings of the Royal Society A*, **471**, 20150187 (28pp).

J4. Pourahmadian F, Mogilevskaya SG (2015). "Complex variables-based approach for analytical evaluation of boundary integral representations of three-dimensional acoustic scattering", *Engineering Analysis with Boundary Elements*, **53**, 9−17.

J3. Pourahmadian F, Ahmadian H, Jalali H (2012). "Modeling and identification of frictional forces at a contact interface experiencing vibro-impacts", *Journal of Sound and Vibration*, **331**, 2874−2886.

J2. Jalali H, Ahmadian H, Pourahmadian F (2011). "Identification of micro-vibro-impacts at the boundary condition of a nonlinear beam", *Journal of Mechanical Systems and Signal Processing*, **25**, 1073−1085.

J1. Ahmadian H, Jalali H, Pourahmadian F (2010). "Nonlinear model identification of a frictional contact support", *Journal of Mechanical Systems and Signal Processing*, **24**, 2844−2854.

Journal Publications In Preparation

J31. Pourahmadian F, Xu Y*. "Inverse scattering via ML-regularized sampling indicators", Planned to be submitted by Feb 2025.

J30. Song J*, Wang C*, Pourahmadian F, Murray T W. "Super-resolution multiplexed laser ultrasonic imaging", Planned to be submitted by May 2025.

J29. Pourahmadian F. "Friction through the prism of operator learning. Part I: Low-frequency and low-magnitude regime", Planned to be submitted by May 2025.

J28. Francis N M*, Shin D, Lebensohn R, Pourahmadian F, Dingreville R. "Augmented Deep Material Networks for Cauchy-to-micropolar upscaling", Planned to be submitted by Summer 2025.

J27. Song J*, Xu Y*, Pourahmadian F, Murray T W. "ML-accelerated laser ultrasonic imaging", Planned to be submitted by May 2025.

J26. Xu Y*, Pourahmadian F. "Compressive poroelastography by way of operator learning", Planned to be submitted by May 2025.

J25. Schmid A C*, Doostan A, Pourahmadian F. "Data-driven constitutive model discovery of particulate composites", Planned to be submitted by Summer 2025.

Invited Talks

I17. Pourahmadian F (2024); collaborators: Song J*, Xu Y*, Wang C*, Narumanchi V V, Murray T W, Schmid A C*, Doostan A. "Data-driven approaches for laser-based imaging and characterization of advanced materials", *Department of Applied Mathematics*, University of Washington, WA.

I16. Pourahmadian F (2024); collaborators: Song J*, Xu Y*, Wang C*, Narumanchi V V, Murray T W, Lum J, Townsend A, Tringe J, Stobbe D M. "Intelligent Laser-based Sensing", *LLNL-CU Boulder Research Summit*, Boulder, CO.

I15. Pourahmadian F (2023); collaborators: Murray T W, Narumanchi V V*, Lum J, Townsend A, Tringe J, Stobbe D M. "Laser ultrasonic imaging using the linear sampling method", *IEEE Research and Applications of Photonics In Defense Conference (RAPID)*, Miramar Beach, FL.

I14. Pourahmadian F (2023); collaborators: Haddar H, Liu X, Murray T W, Narumanchi V V*, Song J*, Xu Y*. "Recent progress in inverse elastic scattering", *Colloquium, Department of Applied Mathematics and Statistics*, Colorado School of Mines, Golden, CO.

I13. Pourahmadian F (2023); collaborators: Xu Y*, Song J*, Murray T W, Narumanchi V V*, Wang C*. "ML-assisted waveform inversion", *17th U. S. National Congress on Computational Mechanics (US-NCCM17)*, Albuquerque, NM.

I12. Pourahmadian F (2023); collaborators: Xu Y*, Song J*, Wang C*, Murray T W, Narumanchi V V*, Haddar H, Liu X. "AI-augmented imaging and characterization of complex components", *Engineering Mechanics Institute (EMI) Dynamics Seminar Series*, Virtual.

I11. Pourahmadian F (2023); collaborators: Song J*, Narumanchi V V*, Xu Y*, Murray T W, Haddar H, Liu X. "Laser ultrasonic imaging via the sampling methods in time and frequency domains", *18th Annual Conference on Frontiers in Applied and Computational Mathematics (FACM 23)*, New Jersey Institute of Technology, Newark, NY.

I10. Pourahmadian F (2022); collaborators: Song J*, Liu X, Haddar H. "Time- vs. frequency- domain ultrasonic tomography", *7th Annual Meeting of SIAM-CSS*, Oklahoma State University, OK.

I9. Pourahmadian F (2021). "Recent progress on inverse scattering in highly heterogeneous solids", *6th Annual Meeting of SIAM-CSS*, University of Kansas, KS.

I8. Pourahmadian F (2019); collaborator: Haddar H. "Recent advances on imaging in complex media", *Inverse Problems Seminar, Department of Mathematics*, Colorado State University, CO.

I7. Pourahmadian F (2019); collaborator: Haddar H. "Waveform tomography in uncertain/unknown media", *SIAM annual meeting on recent progress in wave phenomena*, Laramie, WY.

I6. Pourahmadian F (2018); collaborator: Haddar H. "Differential imaging of evolution in elastic backgrounds with unknown microstructure", *Colloquium, Applied Mathematics Department*, University of Colorado Boulder, CO.

I5. Pourahmadian F (2017); collaborator: Guzina B B. "High-frequency inverse scattering by Topological Sensitivity", *Nonlinear Waves Seminar, Applied Mathematics Department*, University of Colorado Boulder, CO.

I4. Pourahmadian F (2017); collaborators: Guzina B B, Haddar H. "Sounding of heterogeneous fractures in the subsurface", *Nonlinear Waves Seminar, Applied Mathematics Department*, University of Colorado Boulder, CO.

I3. Pourahmadian F (2016); collaborators: Guzina B B, Haddar H. "Sounding of Heterogeneous Fractures in Geomaterials", *CEE Seminar*, Duke University, Durham, NC.

I2. Pourahmadian F, Guzina B B, Haddar H (2015). "Active seismic imaging & characterization of fractures", *CEGE Seminar*, University of Minnesota, Minneapolis, MN.

I1. Guzina B B, Pourahmadian F (2013). "Why the shape reconstruction by topological derivative may work", *CEGE Seminar*, University of Minnesota, Minneapolis, MN.

Technical Presentations

TP36. Francis N M*, Shin D, Lebensohn R, Pourahmadian F, Dingreville R (2024). "A deep material network using micropolar mechanics", *Engineering Mechanics Institute Conference*, Palmer House Hotel, Chicago, IL.

TP35. Xu Y*, Pourahmadian F (2024). "A neural operator learning approach to model poroelastodynamics of rocks", *Engineering Mechanics Institute Conference*, Palmer House Hotel, Chicago, IL.

TP34. Song J*, Pourahmadian F, Murray T W and Narumanchi V V (2024). "Multiplexed laser ultrasonic imaging via the linear sampling method", *Engineering Mechanics Institute Conference*, Palmer House Hotel, Chicago, IL.

TP33. Schmid A C*, Doostan A, Pourahmadian F (2024). "Data-driven discovery of governing equations and mechanical properties from experimental ultrasonic data with quantified uncertainty", *Engineering Mechanics Institute Conference*, Palmer House Hotel, Chicago, IL.

TP32. Pourahmadian F, Xu Y*, Song J*, Murray T W and Narumanchi V V (2024). "ML-regularized functionals for imaging in complex environments", *Engineering Mechanics Institute Conference*, Palmer House Hotel, Chicago, IL.

TP31. Francis N M**, Lebensohn R, Pourahmadian F, Dingreville R (2024). "Micropolar elastoplasticity using fast Fourier transforms", poster presentation, *Material Research Summit*, Los Alamos, NM. * *Invited.*

TP30. Schmid A C*, Doostan A, Pourahmadian F (2024). "Non-destructive evaluation of mock HE material properties", *PSAAP III CU Boulder Multidisciplinary Simulation Center (MSC) Tri-lab Sponsor Team (TST) Meeting*, Los Alamos, NM.

TP29. Schmid A C*, Pourahmadian F, Doostan A (2023). "Data-driven discovery of equations governing ultrasonic wave motion", *17th U. S. National Congress on Computational Mechanics (USNCCM17)*, Albuquerque, NM.

TP28. Francis N M*, Pourahmadian F, Dingreville R, Lebensohn R (2023). "An FFT solver for micropolar composites", *17th U. S. National Congress on Computational Mechanics (USNCCM17)*, Albuquerque, NM.

TP27. Francis N M*, Pourahmadian F, Lebensohn R, Dingreville R (2023). "Fast, meshless evaluation of size-dependent materials", poster presentation, *Sandia Day*, University of Colorado Boulder, CO.

TP26. Schmid A C*, Doostan A, Pourahmadian F (2023). "Governing equation and material property discovery with uncertainty quantification via laser ultrasonics", poster presentation, *Predictive Science Academic Alliance Program (PSAAP) Annual Review Meeting*, University of Colorado Boulder, CO.

TP25. Xu Y**, Pourahmadian F, Song J*, Wang C* (2023). "Deep learning for full-field ultrasonic characterization", poster presentation, *18th Annual Conference on Frontiers in Applied and Computational Mathematics (FACM 23)*, New Jersey Institute of Technology, Newark, NY. *Invited.*

TP24. Schmid A C*, Doostan A, Pourahmadian F (2023). "Governing equation and material property discovery via laser ultrasonics", poster presentation, *Predictive Science Academic Alliance Program (PSAAP) Trilab Sponsor Team (TST) Meeting*, University of Colorado Boulder, CO.

TP23. Song J**, Liu X, Pourahmadian F, Haddar H (2022). "Time-domain linear sampling method for in-situ ultrasonic imaging", *Engineering Mechanics Institute Conference*, Johns Hopkins University, Baltimore, MD. *Jian won the best student paper award from the EMI Elasticity Committee.*

TP22. Xu Y*, Pourahmadian F (2022). "Deep learning tools for ultrasonic elastography", *Engineering Mechanics Institute Conference*, Johns Hopkins University, Baltimore, MD.

TP21. Francis N M*, Dingreville R, Pourahmadian F (2022). "Micromorphic homogenization towards multiscale metamaterial design", poster presentation, *Sandia Day*, University of Colorado Boulder, CO.

TP20. Schmid A C*, Pourahmadian F, Doostan A (2022). "Verification and validation study for partial differential equation and material property discovery via laser ultrasonic experiments", poster presentation, *Predictive Science Academic Alliance Program (PSAAP) Annual Review Meeting*, University of Colorado Boulder, CO.

TP19. Pourahmadian F, Yue H (2021). "Experimental validation of differential evolution indicators", *Engineering Mechanics Institute Conference*, Virtual.

TP18. Pourahmadian F (2021). "Data-driven characterization of micromechanical evolution in highly scattering solids", *14th World Congress on Computational Mechanics (WCCM XIV) and 8th European Congress on Computational Methods in Applied Science and Engineering (ECCOMAS 2020)*, Virtual.

TP17. Napal K†, Pourahmadian F (2020). "Detection and quantification of small cracks aggregates using artificial backgrounds", *Society of Engineering Science Conference*, Virtual.

TP16. Pourahmadian F (2020). "Sampling-based approaches to laser ultrasonics", *Society of Engineering Science Conference*, Virtual.

TP15. Pourahmadian F (2019). "Imaging in highly scattering composites", *Review of Progress in Quantitative Nondestructive Evaluation*, Portland, OR.

TP14. Shakeri R*, Pourahmadian F (2019). "poroelastic imaging of hydraulic fractures", poster presentation, *Engineering Mechanics Institute Conference*, Caltech, CA; and *2019 Hilf Lecture*, Boulder, CO.

TP13. Pourahmadian F, Yue H* (2019). "Differential imaging of evolution in elastic backgrounds with unknown microstructure", *Engineering Mechanics Institute Conference*, Caltech, CA.

TP12. Pourahmadian F (2018). "Real-time imaging of microstructural damage in complex composites", *International Mechanical Engineering Congress & Exposition*, Pittsburgh, PA.

TP11. Pourahmadian F (2018). "Real-time waveform tomography of damage precursors in complex composites", *Review of Progress in Quantitative Nondestructive Evaluation*, Burlington, VT.

TP10. Pourahmadian F (2018). "3D seismic waveform tomography of subsurface fractures", *GRSG Oil and Gas Remote Sensing Workshop*, Boulder, CO.

TP9. Pourahmadian F (2017). "Active monitoring of fracturing in quasi-brittle solids: an experimental study", *Engineering Mechanics Institute Conference*, UC San Diego, CA.

TP8. Pourahmadian F, Guzina B B (2016). "Active Elastic-Wave Imaging of Heterogeneous Fractures: From Geometric Reconstruction to Interfacial Characterization", *Engineering Mechanics Institute Conference*, Vanderbilt University, Nashville.

TP7. Pourahmadian F, Guzina B B (2015). "A hybrid approach to active seismic imaging of fractures: geometric reconstruction & interface characterization", *International Mechanical Engineering Congress and Exposition*, Houston.

TP6. Pourahmadian F, Tokmashev R D, Risch P A, Guzina B B (2015). "Imaging and Characterization of Fracture Interface: An Experimental Study", *Review of Progress in Quantitative Nondestructive Evaluation*, Minneapolis, MN.

TP5. Pourahmadian F, Guzina B B (2015). "Simultaneous recovery of fracture geometry and boundary condition at high frequencies", *Engineering Mechanics Institute Conference*, Stanford University, CA.

TP4. Pourahmadian F, Tokmashev R D, Guzina B B (2015). "On the Elastic-wave Imaging and Interfacial Characterization of Heterogeneous Fractures", *IMA Hot Topics Workshop "hydraulic fracturing: from modeling and simulation to reconstruction and characterization"*, Institute of Mathematics and its Applications (IMA), Minneapolis, MN.

TP3. Guzina B B, Pourahmadian F (2014). "Why the obstacle reconstruction by topological sensitivity may work", *11th World Congress on Computational Mechanics (WCCM XI)*, Barcelona, Spain.

TP2. Pourahmadian F, Guzina B B (2013). "Why the shape reconstruction by topological sensitivity may work", *International Conference on Novel Directions in Inverse Scattering*, University of Delaware, DE.

TP1. Pourahmadian F, Guzina B B (2013). "Qualitative identification of the interfacial condition in cracks via the method of topological sensitivity", *Society of Engineering Science 50th Annual Technical Meeting*, Brown University, RI.

Refereed Conference Papers

CP5. Pourahmadian F, Guzina B B, Haddar H (2017). "Generalized linear sampling method for active imaging of subsurface fractures", *WAVES 2017*, Minneapolis, MN.

CP4. Pourahmadian F (2017). "Real-time monitoring of heterogeneous fractures in rock: an experimental study", *51th US Rock Mechanics/Geomechanics Symposium*, San Francisco, CA.

CP3. Pourahmadian F, Guzina B B (2016). "Active ultrasonic imaging and interfacial characterization of stationary and evolving fractures in rock", *50th US Rock Mechanics/Geomechanics Symposium*, Houston, Texas.

CP2. Pourahmadian F, Ahmadian H, Jalali H (2010). "Identifying slip-slap forces in the contact interface using dual-mode excitation", *International Conference on Noise and Vibration Engineering*, Leuven, Belgium, pp 1235-1244.

CP1. Pourahmadian F, Jalali H, Ahmadian H (2010). "Identifying normal modes of a nonlinear system", *10th International Conference on Recent Advances in Structural Dynamics*, Southampton, UK.

Funded proposals

As PI:

- Hierarchical design of metamaterials architectures for mechanical barriers via generalized homogenization and physics-informed neural networks, *SNL-CEAS Research Partnership*, CU-Boulder PI: Pourahmadian, SNL-PI: Remi Dingreville, $150,000 (01/10/2022-05/15/2024)

- Real-time In-situ Characterization of Evolving Rock Systems for Smart-controlled Subsurface Engineering: A Holistic Multiscale & Multiphysics Solution, *NSF CAREER*, PI: Pourahmadian, $500,000 (06/01/2020-09/30/2025)

- Data-driven Engineering Science Seminars, *CEAS Interdisciplinary Seminars* (funds matched by the departments), Co-organizers: Pourahmadian (CEAE/lead), Doostan (AES), Becker (APPM), Brown (CS), Murray (ME), Piestun (ECEE) $11,000 (01/10/2022-12/30/2023)

- Differential Tomography of Evolution in Uncertain/Unknown Environments, *CU-Boulder IS-IRT Seed Grants*, PI: Pourahmadian, Collaborator: Appelo, $20,000 (02/21/2019-12/30/2019)

- Real-Time Imaging and Characterization in Complex Composites, *CU-Boulder IS-IRT Seed Grants*, PI: Pourahmadian, Collaborator: Regueiro, $30,000 (02/21/2018-12/30/2018)

- Imaging Science Seminar Grant, CU-Boulder IS-IRT, PI: Pourahmadian, $5,000 (2018-2020)

As Senior Person:

- SNL internship granted to PhD student Noah Francis to continue his work on the project entitled "Hierarchical design of metamaterials architectures for mechanical barriers via generalized homogenization and physics-informed neural networks" which was funded earlier via SNL-CEAS Research Partnership, $120,000 (05/15/2024-08/15/2025)

- Center for micromorphic multiphysics porous and particulate materials simulations within exascale computing workflows, *PSAAP III*, PI: R. Regueiro, Co-PIs: J. Brown, A. Clarke, A. Doostan, H. Tufo, Institutions: University of Colorado Boulder, Colorado School Mines, Columbia University, Stanford University, U of Tennessee, Knoxville, University of Texas Dallas, Pourahmadian's share $337,500 (06/01/20-09/30/25)

- Numerical Methods for Wave Equations in Time and Frequency Domain, *NSF DMS*, PI: Daniel Appelo, $303,373 (06/15/2019-05/31/2022)

Selected declined proposals

As PI:

- A universal approach to elastic-wave cloaking, *CU-Boulder Seed Grants*, PI: Pourahmadian, Collaborator: Mahmoud Hussein, $50,000 (02/15/17-08/15/18)

- Frontiers in Nuclear Infrastructure: Safety, Monitoring and Regulation, *NRC-HQ-60-18-FOA-0001*, Young Faculty Recipients: F. Pourahmadian and Mija Hubler, Senior PIs: Ron Pak and Victor Saouma, $600,000 (04/01/2018 - 03/31/2021)

- Real-time Remote Sensing of Treatment-Induced Hydraulic fractures in Unconventional Oil and Gas Reservoirs, *DOE DE-FOA-0001990*, PI: Pourahmadian, Co-PIs: Brice Lecampion, Smaine Zeroug, Rich Regueiro, $1,064,718 (9/1/19-8/31/22)

- General Scientific Infrastructure: 3D Scanning Laser Vibrometer for high-fidelity in-situ characterization and prognosis of irradiated structural materials, *DOE-NEUP Full proposal*, PI: Pourahmadian, Collaborators: Victor Saouma, Rich Regueiro, Todd Murray, Remi Dingreville, $550,000 (06/01/19-06/01/20)

- Differential imaging of evolution in highly heterogeneous composites with unknown micro/macrostructure, *NSF DCSD*, PI: Fatemeh Pourahmadian, Co-PI: Todd Murray, $355,462 (10/1/19-9/30/22)

- Hierarchical Design of Mechanical Barriers via Data-driven Synthesis of Generalized Continua, *NSF MOMS*, PI: Pourahmadian, Collaborators: Ricardo Lebensohn, Joseph Tringe, Todd Murray, $427,527 (06/01/24-05/31/27)

- Data-driven Synthesis of Hierarchical Materials for Extreme Dynamic Functionalities, submitted to *DOE CAREER*, PI: Pourahmadian, Collaborator: Ricardo Lebensohn, $888,284 (10/01/2024-09/30/2029)

As Senior Person:

- Inertial Surface Coating: New Paradigm for Silencing Structural Materials, *CU-Boulder Seed Grants*, PI: Mahmoud Hussein, Collaborator: Pourahmadian $50,000 (02/15/17-08/15/18)

- NRT: Focusing Waves on Information, Safety, and Health (WISH), *NSF NRT*, PI: Todd Murray, Rafael Piestun, Stephen Becker, Carol Cogswell, $3,000,000 (9/1/2019-8/31/2024)

- Intelligent laser ultrasonic testing, PI: Todd Murray, Collaborator: Pourahmadian $50,000 (04/15/24-08/15/25)

Scholarships & Fellowships

- Sommerfeld Fellowship (2011-2012)
  Civil, Environmental & Geo- Engineering Department
  University of Minnesota

- Daneshy Fellowship (Fall 2014, Fall 2015)
  Civil, Environmental & Geo- Engineering Department
  University of Minnesota

Honors & Awards (as student)

- Ranked 1st for the highest CGPA (class of 2010)
  Mech. Eng. Department, Iran University of Science and Technology

- Outstanding Student Award (Fall 2009)
  Mech. Eng. Department, Iran University of Science and Technology

- Ranked among top 2% of about 5,000 participants (2007)
  National entrance exam for M.Sc. degree in Mech. Eng.

- Ranked 2nd for the highest CGPA (class of 2007)
  Mech. Eng. Department, University of Tabriz

- Outstanding Student Award (Fall 2007)
  Mech. Eng. Department, University of Tabriz

- Outstanding Student Award (Fall 2004)
  Mech. Eng. Department, University of Tabriz

- Ranked among top 0.3% of about 400,000 participants (2003)
  National entrance exam on math-physics for undergraduate studies

- Awarded in the 2nd round of national Mathematics Olympiad (1999)

Teaching

- CVEN 5151: Wave Methods for Design and Characterization of Advanced Materials (Spring 2017, 2019, 2021, 2023)
- CVEN 5111: Structural Dynamics (Fall 2018, 2019, 2020, 2021, 2022)
- CVEN 3718: Geotechnical Engineering II (Fall 2017, Spring 2019, 2020, 2021)
- CVEN 3111: Analytical Mechanics II: Dynamics (Spring 2022, 2023, 2024)
- CVEN 2121: Analytical Mechanics I: Statics (Fall 2023, 2024)
- MCEN 2023: Statics & Structures (Fall 2024)

Advising

- **Postdocs:**

  – Jian Song (Fall 2024 –)

- **PhD Students*:**

  – Yang Xu, PhD Candidate (Spring 2021– Summer 2025)

  – Noah Francis, PhD Candidate (Fall 2021– Summer 2026); co-advised with Remi Dingreville of SNL

  – Abigail Schmid, PhD Candidate (Fall 2021– Summer 2025); co-advised with Alireza Doostan of AES

  – Conglin Wang, (Fall 2024–Summer 2028); co-advised with Todd Murray of ME
  * I serve as the primary advisor for all students

- **Undergraduate Researchers:**

  – Haonan Xu (Spring 2025–)

- **Past postdocs:**

  – Kevish Napal (2019–2021), now in the Department of Mechanical Engineering at the University of Sheffield, UK

  – Peter Kirkwood (2017–2018), next at Tonkin and Taylor, New Zealand

  – David Stobbe (Feb 2018–Dec 2018), now at Lawrence Livermore National Laboratory

- **Past PhD students:**

  – Jian Song (2020–2024), now a postdoctoral researcher at CU Boulder, CO

  – Vyjayanthi V Narumanchi (2021–2023), primary advisor Todd Murray of ME, now at E Ink, CA

- **Past MSc students:**

  – Yang Xu (2021–2024), now a PhD student at CU Boulder, CO

  – Jian Song (2020–2024), now a postdoctoral researcher at CU Boulder, CO

  – Bisman Singh (2023–2024), now at Goldman Sachs, IL

– Hao Yue (2019−2020), now a PhD student in the Biomedical Engineering Department at the City University of Hong Kong

– Greg Maris (2017−2018), now at Knight Piesold, CO

- **Past undergraduate Researchers:**
  – Conglin Wang (Summer 2022− Summer 2024)
  – Emily Szabo (Fall 2021−Fall 2022)
  – Jian Song (Fall 2019−Fall 2020)
  – Hao Yue (Fall 2017−Fall 2019)

Service

- Chair of the *Elasticity Committee* in the Engineering Mechanics Institute (EMI), Fall 2023- (Member as of Fall 2019)
- Member of the *EMI Machine Learning In Mechanics Committee*, Fall 2021-
- Member of the *EMI Dynamics Committee*, Fall 2021-
- Member of the *EMI Properties of Materials Committee*, Fall 2021-
- Co-organizer of the *Data-driven Engineering Science Seminars*, College of Engineering & Applied Science, University of Colorado Boulder, 2022-2023
- Organizer of the *Imaging Science Seminar Series*, College of Engineering & Applied Science, University of Colorado Boulder, 2018-20
- Coordinator of the CEAE *Engineering Science Program*, University of Colorado Boulder, Fall 2021-2024
- Member of:
  – CEAS Math Committee, December 2023-
  – CEAE Department Graduate R&A Committee, AY 2021-
  – CEAE Department Coursera Task Force, AY 2024-
  – CEAE Department AI Task Force, AY 2024-
  – CEAE Department Undergraduate Pathways Committee, January 2022-2024
  – CEAE Department Computer Committee, AY 2018-2023
  – CEAE Department Curriculum Committee, AY 2017-18
  – CEAS Imaging Science Search Committee, AY 2018-19

- Mentor in the NSF S-STEM Program, advising (2019-2021): Claudia Acosta-Pina, Michelle Amankwah, Erika Antunez

- Thesis committee member:
  – Niket Pathak (ME)
  – Rosa Morales (ME)
  – Enrique Chon (Geophysics)
  – John Nardini (APPM)
  – Clemence Bacquet (AES)
  – Jackson Bell (Geophysics)

- Reviewer for:
  – NSF ECI (mail-in)
  – NSF MOMS (panelist, mail-in)
  – CU Boulder's Innovative Seed Grant
  – CU Boulder's AB Nexus Grant
  – CU Boulder's UROP Grant

- Co-chair of mini-symposium on:

  − digital twins, *45th Annual Review of Progress in Quantitative Nondestructive Evaluation*, Burlington, VT, July 2018 (with Steve Holland, Iowa State University)

  − novel methods in imaging and multiscale characterization of damage in complex materials, *Engineering Mechanics Institute Conference*, Caltech, CA, June 2019 (with Dianne Ezell, Oak Ridge National Laboratory)

  − physics-based data analytics for characterization of natural and architected systems, *Society of Engineering Science Conference*, Minneapolis, MN, October 2021 (with Bojan Guzina, University of Minnesota); postponed due to COVID

  − data-driven approaches to engineering mechanics, *Engineering Mechanics Institute Conference*, Johns Hopkins University, MD, June 2022 (with Jeong-Hoon Song)

  − data-driven approaches to engineering mechanics, *Engineering Mechanics Institute Conference*, Chicago, IL, May 2024 (with John Brigham, Alessandro Fascetti, Evgueni Filipov, Tom Seidl)

  − advances and applications of elasticity within applied mechanics, *Engineering Mechanics Institute Conference*, Chicago, IL, May 2024 (with John Brigham)

- Referee for:
  − Proceedings of the Royal Society A
  − SIAM Journal on Applied Mathematics
  − Geophysics
  − Materials Evaluation
  − IMA Volumes in Mathematics and its Applications
  − Journal of Applied Physics & Nanotechnology
  − Journal of Mechanical Systems & Signal Processing
  − Inverse Problems
  − Journal of Inverse Problems in Science & Engineering
  − Ultrasonics
  − Nondestructive Testing and Evaluation
  − Journal of Engineering Mechanics
  − ASME Journal of Computing and Information Science in Engineering
  − ASME Journal of Vibration and Acoustics
  − International Journal of Mechanics and Materials in Design
  − International Journal of Rock Mechanics and Mining Sciences

- Member of:
  − Engineering Mechanics Institute (EMI)
  − Society for Industrial and Applied Mathematics (SIAM)
  − U. S. Association for Computational Mechanics (USACM)
  − Society of Engineering Science (SES)
  − American Rock Mechanics Association (ARMA)
  − American Society of Mechanical Engineers (ASME)
  − American Mathematical Society (AMS)