

## SIAMAK MIRFENDERESKI

 [siamak.mirfendereski@colorado.edu](mailto:siamak.mirfendereski@colorado.edu)

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### EDUCATION

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- Ph.D., Mechanical Engineering-Fluid Mechanics, 2017 – 2022  
**University of Nebraska - Lincoln (UNL),**  
Dissertation: “*Multiscale hydrodynamics and rheology of dense suspensions undergoing nonlinear electrokinetics towards active rheology control*”  
Thesis advisor: Prof. Jae Sung Park
- M.Sc., Mechanical Engineering-Energy Conversion, 2010 – 2013  
**Amirkabir University of Technology (Tehran Polytechnic),** Iran,  
Thesis: “*Numerical and experimental study of laminar forced convection of nanofluid in a helical tube at constant heat flux*”  
Thesis advisors: Prof. Abbass Abassi, and Prof. Majid Safar Avval
- B.Sc., Mechanical Engineering, 2005 – 2010  
**Isfahan University of Technology,** Iran,  
Thesis: “*Propagation simulation of acoustic waves in room area*”  
Thesis advisor: Prof. Saeed Ziaie Rad

### RESEARCH AND PROFESSIONAL EXPERIENCE

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- University of Colorado Boulder 2024 – present  
**Postdoctoral Research Associate,** Chemical & Biological Engineering  
Mentor: Prof. Ankur Gupta
- University of Nebraska – Lincoln 2023  
**Postdoctoral Research Associate,** Mechanical & Materials Engineering  
Mentor: Prof. Jae Sung Park
- Self-employed 2015 – 2017  
**Mechanical Engineering Consultant**
- ARAMICO CO. 2012 – 2014  
**R&D Engineer**

### HONORS AND AWARDS

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- Research highlighted in *The New York Times*, *National Geographic (España)*, *Science Magazine Newsletter*, *CU Boulder Today*, and *others* for work published in *Matter* (Cell Press), 2025.
- *Outstanding Postdoc of the Year – Honorable Mention*, CU Boulder, 2025.
- *Outstanding Doctoral Dissertation Award*, College of Engineering, UNL, 2023.
- *Outstanding Graduate Research Assistant Fellowship award*, Dep. Mechanical & Materials Engineering, UNL, 2022.

- *College of Engineering Professional Development Fellowship* award, College of Engineering, UNL, 2021.
- *Milton E. Mohr Fellowship* award, College of Engineering, UNL, 2021.
- *Milton E. Mohr Fellowship* award, College of Engineering, UNL, 2020.
- *Hemsworth Graduate Fellowship* award, Dep. Mechanical & Materials Engineering, UNL, 2019.
- *Travel grant for the Open Science Grid (OSG)* school, University of Wisconsin Madison, 2018.

## JOURNAL PUBLICATIONS

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[Google Scholar Profile](#): >116 citations; h-index = 6

Author of **15** research articles

1. **S. Mirfendereski**, A. Gupta, “Imperfect Turing patterns: diffusiophoretic assembly of hard spheres via reaction-diffusion instabilities.” *Matter* (2025) (Featured in the [New York Times](#), [National Geographic \(España\)](#), [Science Magazine Newsletter](#), [CU Boulder Today](#), and others. Full media coverage [Available here](#))
2. A. Shi, **S. Mirfendereski**, A. Gupta, D. K. Schwartz, “Electrokinetic Nanoparticle Transport in an Interconnected Porous Environment: Decoupling Cavity Escape and Directional Bias” *PNAS*, 122 (46) e2514874122 (2025) (Featured in [The Conversation](#)).
3. **S. Mirfendereski**, L. Bayer, A. Gupta, “Exclusion zone formation and onset of flow instability in colloidal suspensions driven by multi-ion diffusiophoresis and ion-exchange membrane.” (soon to be submitted)
4. S. M. Hosseini, **S. Mirfendereski**, J. S. Park, “Two-dimensional dynamics and microstructure of dense suspensions of ideally polarizable particles in an electric field: The nontrivial effect of confinement”, *Phys. Rev. E* 111(4), 045104 (2025).
5. J. R. Brooks, T. Heiman, S. Lorenzen, I. Mungloo, **S. Mirfendereski**, J. S. Park, R. Yang, “Transepithelial Electrical Impedance Increase Following Porous Substrate Electroporation Enables Label-Free Delivery” *Small* (2024).
6. **S. Mirfendereski**, J. S. Park, “Rheology of dense suspensions of ideally conductive particles in an electric field.” *J. Fluid Mech.* **977** (2023) A35
7. **S. Mirfendereski**, J. S. Park, “Multiscale nature of electric-field-induced structural formations in non-colloidal suspensions.” *Soft Matter* **18**, (2022) 6916-6926.
8. **S. Mirfendereski**, J. S. Park, “Direct numerical simulation of a pulsatile flow in a stenotic channel using immersed boundary method.” *Eng. Rep.* **4(1)** (2022) e12444.
9. J. R. Brooks, I. Mungloo, **S. Mirfendereski**, J. P. Quint, D. Paul, A. Jaber, J. S. Park, R. Yang, “An equivalent circuit model for localized electroporation on track etched membranes.” *Biosens. Bioelectron.*, **199** (2022) 113862
10. **S. Mirfendereski**, J. S. Park, “The zero-shear-rate limiting rheological behaviors of ideally conductive particles suspended in concentrated dispersions under an electric field.” *J. Rheol.* **65.1** (2021) 13-26.

11. E. A. Davis\*, **S. Mirfendereski**\*, J. S. Park, “On the comparison of flow physics between minimal and extended flow units in turbulent channels.” *Fluids* **6.5** (2021) 192. \* Equal contribution
12. **S. Mirfendereski**, J. S. Park, "Dipolophoresis in concentrated suspensions of ideally polarizable spheres." *J. Fluid Mech.* **875** (2019) R3
13. M. Mousavi, **S. Mirfendereski**, J. S. Park, J. Eun, “Experimental and numerical analysis of a sustainable farming compartment with evaporative cooling System.” *Processes* **7(11)** (2019) 823
14. **S. Mirfendereski**, A. Abbassi, M. Saffar-Avval, “Experimental and numerical investigation of nanofluid heat transfer in helically coiled tubes at constant wall heat flux,” *Adv. Powder Tech.* **26** (2015) 1483-1494.
15. **S. Mirfendereski**, J. S. Park, “Active rheology control for concentrated suspensions of conductive particles via electric field.” (soon to be submitted)

## INVITED TALK

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1. **S. Mirfendereski**, “Diffusiophoresis in Focus: From Biological Pattern Formation to Flow Instabilities Near Ion-Exchange Membranes”, Seminar speaker, *Dep. Chemical & Biological Engineering, CU Boulder.* 9/23/2025.

## CONFERENCE PRESENTATIONS

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The “name” denotes the presenter

1. **S. Mirfendereski**, L. Bayer, A. Gupta (2025) “Diffusiophoresis-driven exclusion zone formation near an ion-exchange interface and onset of hydrodynamic instability: experiments and simulations”, *78<sup>th</sup> Annual Meeting of the APS-DFD*, Houston, TX.
2. **S. Mirfendereski**, A. Gupta (2025) “Diffusiophoretic assembly of finite-size cells via reaction-diffusion chemical signal: imperfect Turing patterns”, *78<sup>th</sup> Annual Meeting of the APS-DFD*, Houston, TX.
3. J. S. Park, T. Alo, Y. Jeong, **S. Mirfendereski**, J. Seo, S. Song, (2025) “Toward a correlation for the effective slip length of superhydrophobic surfaces in turbulent flows”, *78<sup>th</sup> Annual Meeting of the APS-DFD*, Houston, TX.
4. **S. Mirfendereski** (2025) “From Particle-Level to Suspension Macroscopic Properties: Multi-Scale Control of Complex Fluids, Leveraging Electrokinetic Phenomena”, *2025 AIChE Annual Meeting*, Boston, MA.
5. **S. Mirfendereski**, L. Bayer, A. Gupta (2025) “Diffusiophoretic Exclusion Zone Formation Near Ion-Exchange Membrane and the Onset of Flow Instability”, *2025 AIChE Annual Meeting*, Boston, MA.
6. **S. Mirfendereski** (2025) “Roles of Diffusiophoresis and Electrokinetic Phenomena in Suspensions: From Biological Pattern Formation and Exclusion Zone Dynamics to Suspension Mechanical Responses”, *2025 AIChE Annual Meeting*, Boston, MA.
7. **S. Mirfendereski** (2025) “Multiscale Fluid Mechanics, Electrokinetic and Interfacial Phenomena: From Colloidal Transport to Engineering Complex Fluids, Smart Materials, and Process Applications”, *2025 AIChE Annual Meeting*, Boston, MA.
8. **S. Mirfendereski**, A. Gupta (2025) “Imperfect Turing Patterns: Diffusiophoretic Assembly of Hard Spheres Via Reaction-Diffusion Instabilities”, *2025 AIChE Annual Meeting*, Boston, MA.

9. **S. Mirfendereski**, E. Coleman, A. Gupta, (2024), “Particle-Level simulations using diffusiophoresis and cellular automata to create dynamic Turing patterns”, *77<sup>th</sup> Annual Meeting of the APS-DFD*, Salt Lake City, UT.
10. **L. Bayer**, **S. Mirfendereski**, A. Gupta, (2024), “Diffusiophoresis-Induced Rayleigh-Taylor Instability”, *77<sup>th</sup> Annual Meeting of the APS-DFD*, Salt Lake City, UT.
11. **E. Coleman**, **S. Mirfendereski**, A. Gupta (2024), “Diffusiophoretic Symphony: Creating Chemotactic Movements in Lenia”, *77<sup>th</sup> Annual Meeting of the APS-DFD*, Salt Lake City, UT.
12. **E. Coleman**, **S. Mirfendereski**, A. Gupta, (2024), “A Reaction-Diffusion-Chemotaxis Model to Understand the Collective Behavior of Microbial Life”, *77<sup>th</sup> Annual Meeting of the APS-DFD*, Salt Lake City, UT.
13. **S. Mirfendereski**, B. Alessio, E. Coleman, A. Gupta, (2024), “Diffusiophoresis-Enhanced Turing Patterns: Continuum and Particle-level Simulations” in the technical session Directed and Self-Assembly” *98<sup>th</sup> ACS Colloids and Surface Science Symposium*, UW, Seattle, WA
14. **S. Mirfendereski**, B. Alessio, E. Coleman, A. Gupta, (2024), “Merging Turing Patterns & Cellular Automata: Simultaneously Assembling & Evolving Structures”, *ACS Fall*, Denver, CO
15. **S. Mirfendereski**, **A. Gupta** (2024) “Merging Turing Patterns and Cellular Automata: Simultaneously Assembling and Evolving Structures Via Diffusiophoresis”, *2024 AIChE Annual Meeting*, San Diego, CA
16. **S. Mirfendereski**, **J. S. Park**, (2024), “Dynamics and rheology of dense suspensions of highly conductive particles in an electric field: towards active rheology control”, *ICTAM*, Daegu, South Korea.
17. **S. Mirfendereski**, J. S. Park, (2023) “Tunable rheology of dense suspensions of conductive particles via an applied electric field.”, *76<sup>th</sup> Annual Meeting of the APS-DFD*, Washington, DC.
18. **S. Mirfendereski**, J. S. Park, (2023) “Toward a physical model for the effective slip length of superhydrophobic surfaces in turbulent flows”, *76<sup>th</sup> Annual Meeting of the APS-DFD*, Washington, DC.
19. **S. M. Hosseini**, **S. Mirfendereski**, J. S. Park, (2023) “Non-equilibrium gel formation in suspensions of conductive particles in electric field”, *76<sup>th</sup> Annual Meeting of the APS-DFD*, Washington, DC.
20. **S. Mirfendereski**, S. M. Hosseini, J. S. Park, (2023) “Multiscale responses of sheared non-colloidal particles undergoing dipolar interactions in an electric field”, *97<sup>th</sup> ACS Colloid and Surface Science Symposium*, Raleigh, NC.
21. **S. M. Hosseini**, **S. Mirfendereski**, J. S. Park, (2023) “Confinement-induced dynamics in two-dimensional suspensions of conductive particles in an electric field”, *97<sup>th</sup> ACS Colloid and Surface Science Symposium*, Raleigh, NC.
22. **S. Mirfendereski**, J. S. Park, (2022) “Micro-meso-macroscale responses of non-colloidal suspensions undergoing dipolar interactions in an electric field: effects of confinement”, *75<sup>th</sup> Annual Meeting of the APS-DFD*, Indianapolis, IN.
23. **S. M. Hosseini**, J. S. Park, **S. Mirfendereski**, (2022) “Static and dynamic equilibrium states driven by induced-charge electrophoresis in two-dimensional suspensions”, *75<sup>th</sup> Annual Meeting of the APS-DFD*, Indianapolis, IN.
24. **S. Mirfendereski**, J. Brooks, J. S. Park, R. Yang (2022) “Electrokinetics-Driven Transport of Charged Nanoparticles Through Micro and Nanochannels”, *IMECE2022-99799*, Columbus, OH.
25. **S. Mirfendereski**, J. S. Park, (2022) “Electric-field-induced active rheology control for concentrated suspensions of conductive particles” *93<sup>rd</sup> Annual Meeting of The Society of Rheology*, Chicago, IL.

26. **S. Mirfendereski**, J. S., Park, (2022) "Collective dynamics and rheology of concentrated suspensions of conductive particles in an electric field: Implications for active rheology control" *96<sup>th</sup> ACS Colloid and Surface Science Symposium*, Golden, CO.
27. **S. Mirfendereski**, J. S. Park, (2022) "Nonlinear electrokinetic effects on dynamics and rheology of concentrated suspensions of conductive particles in shear flow" *19<sup>th</sup> USNCTAMS*, Austin, TX.
28. **S. Mirfendereski**, J. S. Park, (2021) "Multi-scale dynamics of semi-dilute and concentrated suspensions of dielectric particles in an electric field." *74<sup>th</sup> Annual Meeting of the APS-DFD*, Phoenix, AZ.
29. **E. A. Davis**, J. S. Park, **S. Mirfendereski** (2021) "On the efficacy of minimal flow units in simulating "healthy" turbulence in plane Poiseuille flows." *74<sup>th</sup> Annual Meeting of the APS-DFD*, Phoenix, AZ.
30. **S. Mirfendereski**, J. Brooks, R. Yang, J. S. Park (2021) "Electrokinetic transport of nanoparticles through micro and nanochannels" *AICHE Annual Meeting*, Boston, MA.
31. **S. Mirfendereski**, J. S. Park, (2021) "Computational study on flow physics and hemodynamic parameter in single and double stenotic Channels" *IMECE2021-77229*, online.
32. **S. Mirfendereski**, J. S. Park, (2021) "Modeling and validation of extrusion-based biomaterials printing in additive manufacturing" *IMECE2021-77348*, online.
33. **S. Mirfendereski**, J. S. Park, (2021) "Rheology of sheared suspensions of conductive particles in an electric field." *92<sup>nd</sup> Annual Meeting of The Society of Rheology*, Bangor, ME.
34. **S. Mirfendereski**, J. S. Park (2021) "Effects of Brownian diffusion on dynamics of concentrated suspensions of ideally conductive particles in an electric field" *APS March meeting 2021*, online.
35. **S. Mirfendereski**, J. S. Park (2020) "Dynamics and rheology of conductive particle suspensions in an electric field from dilute to concentrated regimes" *18<sup>th</sup> International Congress on Rheology*, online.
36. **S. Mirfendereski**, J. S. Park (2020) "Direct numerical simulations of semi-dilute and concentrated suspensions of non-conductive particles in an electric field." *73<sup>rd</sup> Annual Meeting of the APS-DFD* online.
37. **E. Davis**, A. Sareen, **S. Mirfendereski**, E. Longmire, J. S. Park (2020) "Characterization of low-drag events at a moderate Reynolds number of  $Re_\tau = 700$ " *73<sup>rd</sup> Annual Meeting of the APS-DFD*, online.
38. J. S. Park, **S. Mirfendereski**, (2020) "Direct numerical simulation of pulsatile flow around single or double stenosis using Immersed Boundary Method" *IMECE2020-25077*, online.
39. **S. Mirfendereski**, J. S. Park, (2019) "Non-intuitive behavior in concentrated suspension of ideally polarizable particles in an electric field." *72<sup>nd</sup> Annual Meeting of the APS-DFD*, Seattle, WA.
40. **S. Mirfendereski**, J. S. Park, (2019) "Dynamics and rheology of concentrated suspensions of polarizable particles in an electric field." *91<sup>st</sup> Annual Meeting of The Society of Rheology*. Raleigh, NC.
41. **S. Mirfendereski**, F. Aghabaglou, A. Tamayol, **J. S. Park** (2019) "Predicting the distribution of drugs delivered using needleless liquid Jet Injectors." *IMECE2019-13103*, Salt Lake City, UT.
42. **S. Mirfendereski**, **J. S. Park**, (2019), "A particle-level computational investigation of electrophoretic deposition for fabrication of battery electrodes." *AJKFLUIDS2019-5551*, San Francisco, CA.
43. **S. Mirfendereski**, J. S. Park (2019) "Particle-laden slurry flow in an electric field" *UNL research fair*, Lincoln, NE.
44. **S. Mirfendereski**, J. S. Park, (2018) "Electrokinetics in concentrated suspensions of ideally polarizable spheres." *71<sup>st</sup> Annual Meeting of the APS Division of Fluid Dynamics*, Atlanta, GA.

45. **S. Mirfendereski**, J. S. Park, (2018), “Fluid-structure interactions using an Immersed Boundary Method: A turbulence generator.” *IMECE2018-89305*, Pittsburg, PA.
46. **J. S. Park**, **S. Mirfendereski**, S. Mousavi, J. Eun, (2018) “Dynamic numerical simulation of heat transfer and fluid flow in Sustainable Farming Compartment.” *IMECE2018-89254*, Pittsburg, PA.
47. **S. Mirfendereski**, J. S. Park, (2018) “Dynamics of concentrated suspensions of polarizable particles under an electric field” *2<sup>nd</sup> Annual Nebraska Microfluidic Symposium at Creighton University*, Omaha, NE.
48. **S. Mirfendereski**, **J. S. Park**, (2018) “Concentrated suspensions in an electric field: Suspension dynamics and rheology”. *90<sup>th</sup> Annual Meeting of The Society of Rheology*, Houston, TX.
49. **S. Mirfendereski**, J. S. Park, (2017), “Dynamic fluid/heat transport simulations of sustainable farming compartment”, *MME third Annual Research fair*, Lincoln, NE.

## SKILLS

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- **Research Expertise:** Fluid mechanics, micro-hydrodynamics, turbulence, colloidal suspensions, porous media, rheology, electrokinetics, transport phenomena, heat transfer, multiphase flow, bio-flow/bio-fluids, and complex fluids.
- **Numerical Modeling & Simulation:** Computational fluid dynamics (CFD), solver development, multiphase flow, Stokesian dynamics (SD) simulation, fluid-solid interaction (FSI), Immersed Boundary Method (IBM), multiphysics simulation, heat transfer, and simulation of reaction-diffusion processes.
- **High-Performance Computing (HPC) & Version Control:** Large-scale computing, cluster computing, Slurm, and version control systems (Git, GitHub).
- **Programming Languages:** Fortran, MATLAB, Python, Unix Shell, C++.
- **Computer-Aided Engineering (CAE) Software:** ANSYS (CFX, FLUENT), ABAQUS, COMSOL.
- **Computer-Aided Design (CAD) Software:** SolidWorks, Inventor, AutoCAD, CATIA.
- **Optimization & Machine Learning:** Gradient-based optimization, genetic algorithms, deep learning
- **Experimental Techniques:** Thermo-fluidic experimentation, particle image velocimetry (PIV), microfluidics, capillary flow.
- **Leadership & Research Management:** Project leadership, mentorship, interdisciplinary collaboration, and guiding research teams toward innovative solutions.
- **Collaborative Problem-Solving:** Strong analytical and strategic thinking skills to tackle complex research challenges in multidisciplinary environments.
- **Research Planning, Execution, and Communication:** Designing and managing research projects, developing methodologies, analyzing results, and communicating findings through scientific writing and technical presentations.

## RESEARCH INTERESTS

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- Fluid Dynamics
- Computational Fluid Dynamics
- Stokesian Dynamics Simulations
- Micro-hydrodynamics
- Turbulent Flow
- Porous Media
- Fluid Flow in Complex Geometries
- Multiphysics systems
- Complex Fluids
- Rheology
- Bio-fluids
- Machine Learning
- Particle-laden Flow
- Optimization
- Renewable Energies
- Ionic transport
- Electrokinetics
- Active Matter
- Fluid-Solid Interaction
- DNS
- Micro-Fluidics
- Experimental Studies
- PIV

## RESEARCH EXPERIENCE

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- **Postdoctoral Research Associate** 2024 - present  
**Department of Chemical & Biological Engineering, University of Colorado, Boulder**  
**Mentor:** Prof. Ankur Gupta
  - Conducted collaborative research with Prof. Daniel K. Schwartz's lab (CU Boulder) to develop physical and phenomenological models for nanoparticle transport in porous media (composed of an interconnected network of spherical nano-cavities) subjected to an external electric field – developed a numerical/theoretical model for nanoparticle transport in a porous spherical nano-cavity.
  - Developed fast, multi-component Eulerian-Lagrangian simulation models of chemotaxis and diffusiophoretic particles under reaction-diffusion signals – creating more realistic representations of biological pattern formation (Turing pattern).
  - Investigated particle assembly and evolutionary behaviors using coupled reaction-diffusion and cellular automata models.
  - Led research on exclusion zone formation induced by ion-exchange membranes and diffusiophoresis, exploring flow instability (Rayleigh-Taylor) through experiments and multiphysics modeling.
  - Developed a high-fidelity multiphysics solver that couples multi-ionic transport with colloidal transport and fluid flow, quantitatively reproducing experimental observations for exclusion-zone formation, onset of flow instabilities, and fingering dynamics while accurately capturing multi-ionic diffusiophoresis and pH-dependent zeta-potential effects.
  - Mentored, advised, and coordinated students on research activities.
  
- **Postdoctoral Research Associate** 2023 - 2024  
**Department of Mechanical & Materials Engineering, University of Nebraska-Lincoln**  
**Mentor:** Prof. Jae Sung Park

- Created a high-fidelity particle-level simulation solver using the Stokesian Dynamics method for simulating the pressure-driven flow of dense particle suspensions – predicting microstructure and macroscopic/rheological properties under external fields.
- Created a CFD solver for direct numerical simulation (DNS) of turbulent channel flow under pulsatile inflow and body force to analyze the effects of pulsation and body force on drag reduction and energy savings.
- Developed a physical model for flow control and turbulent drag reduction using superhydrophobic surfaces by performing direct numerical simulations.
- Developed active rheology control system for conductive particle suspensions under external electric fields.
- Explored rheology & multiscale structures of electrorheological (smart) fluid via Stokesian dynamics simulations
- Mentored graduate students in computational fluid dynamics (CFD), particle-level modeling, and research activities.

• **Graduate Research Assistant** 2017 – 2022

**Department of Mechanical & Materials Engineering, University of Nebraska-Lincoln**

- Developed an in-house Stokesian dynamics (SD) simulation solver in Fortran for large-scale simulations of particle suspensions driven by external shear flow and nonlinear electrokinetic phenomena in an electric field.
- Performed 100+ SD simulations to characterize the dynamics & rheology of dense conductive suspensions undergoing both external shear flow and electric field – proposing a novel active rheology control strategy via an external electric field.
- Performed large-scale numerical simulation using the Smooth Particle Mesh Ewald (SPME) method to characterize the dynamics & rheology of dense suspensions undergoing nonlinear electrokinetic phenomena – studying the effect of Brownian motion.
- Conducted multi-scale structural analysis of dipolar interactive particle suspension in an applied electric field.
- Developed a theoretical/numerical model for the electroporation of nanoparticles in nano/micro-channels in collaboration with an experimental group to optimize porous substrate electroporation for efficient drug delivery in collaboration with Prof. Ruiguo Yang's lab at the University of Nebraska - Lincoln.
- Performed direct numerical simulation (DNS) to characterize the minimum flow units in turbulent channel flow.
- Developed an in-house DNS solver coupled with Immersed Boundary Method IBM using Fortran to simulate blood flow in stenotic arteries and study the atherosclerosis progression.

- Developed a multi-scale CFD solver using the Force Coupling Method (FCM) in Fortran for studying particle motion in blood flow.
  - Created a boundary-fitted CFD code for simulating airflow & heat transfer in sustainable farming compartments in Collaboration with Prof. Jongwan Eun's lab at University of Nebraska-Lincoln.
  - Developed a CFD code for fluid flow simulation in inhomogeneous porous media.
  - Developed a Volume of Fluid code for simulating flow in extrusion-based bioprinting.
  - Performed Stereo Particle Image Velocimetry (SPIV) experiments of turbulent boundary flow in collaboration with Prof. Ellen Longmire's lab at the University of Minnesota.
  - Mentored new graduate students in their research endeavors.
- **Graduate Researcher** 2010 – 2013  
**Department of Mechanical Engineering, Amirkabir University of Technology**
    - Developed an in-house CFD solver in Fortran for simulating flow and convection heat transfer of nanofluid inside the helical tubes (as part of my Master's thesis).
    - Designed and constructed helical coil heat exchangers and developed an experimental model alongside the numerical model (as part of my Master's thesis).

## EDITORIAL AND SERVICE ACTIVITIES

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- Session chair at the American Physics Society-Division of Fluid Dynamics conference, 2024
- Vice-president of the Postdoctoral Association of Colorado Boulder, CU Boulder, 2024 - 2025.
- Reviewer for Journal of Fluid Mechanics, 2024 - 2025.
- Reviewer for ASABE Journal, 2024.
- Volunteered as a poster presentation judge for the Spring Research Fair, UNL, 2023.
- Volunteered as a poster presentation judge for the Graduate Student Symposium, UNL, 2023.
- Proceedings Reviewer for ASME-IMECE Conference 2020-2023.
- Reviewer for JAFM, 2021.
- Proceedings Reviewer for ASME-JSME-KSME (AJK) Joint Fluids Engineering Conference, 2019.

## MENTORING EXPERIENCE

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### Graduate Student Mentee

Seyed Mohammad Hosseini, University of Nebraska-Lincoln, 2022, 2023

#### Achievements:

- Co-author of one journal publication in *Physical Review E*
- Three conference presentations
- Two contributed conference presentations

### Undergraduate Student Advisees

Ethan Coleman, University of Colorado Boulder, 2024, 2025

#### Achievements:

- Two Journal publications in *Physical Review Fluids* and *Next Materials*, 2025
- Undergraduate research award, Academic engagement award, Outstanding undergraduate award 2025.
- Selected for Future Leaders in Chemical Engineering program at NC State and GCURS, 2025.
- One poster presentation and one video recording for the Gallery of Fluid Motion session in 77<sup>th</sup> Annual Meeting of the APS-DFD, Salt Lake City, UT, 2024.
- Presenting technical talks at the 78<sup>th</sup> Annual Meeting of the APS-DFD, Houston, TX, and AICHE Annual Meeting, Boston, MA, 2025
- Three contributed conference presentations

Lucas Bayer, University of Colorado Boulder, 2024, 2025

Achievements:

- Co-author of one soon-to-be submitted research article, 2025
- One poster presentation in the 77<sup>th</sup> Annual Meeting of the APS-DFD, Salt Lake City, UT, 2024
- Co-author of conference presentations at the 78<sup>th</sup> Annual Meeting of the APS-DFD, Houston, TX, and AICHE Annual Meeting, Boston, MA, 2025

Cailin Rogers, University of Colorado Boulder, 2025

## TEACHING EXPERIENCE

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- Completed the Institute for **International Teaching Assistants**, University of Nebraska-Lincoln, 2019.
- **Lab Instructor**, Heat Transfer Lab, Amirkabir University of Technology, 2012
  - Taught heat transfer lab - assisted students during office hours, and graded reports, exams, and assignments.

## INDUSTRIAL EXPERIENCE

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- **Mechanical Engineering Consultant (self-employed contractor)** 2015 – 2017
  - Designed & engineered mechanical systems, demonstrating end-to-end project development from concept through prototyping and testing.
  - Collaborated with clients and contractors to meet project specifications under tight timelines.
- **R&D engineer at ARAMICO Co** 2012 – 2014
  - Modeled and optimized hydropower turbine performance using ANSYS CFX.
  - Engineered and fully designed customized skip-elevator unit for an industrial plant.
  - Gained hands-on experience with industrial R&D processes, bridging simulations with practical fabrication.

## AFFILIATIONS & CERTIFICATES

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- American Physical Society (**APS**)
- Society of Rheology (**SOR**)
- American Chemical Society (**ACS**)

- American Society of Mechanical Engineers (**ASME**)
- American Institute of Chemical Engineers (**AIChE**)
- Certificate in **Rheology: Principles, Measurements, and Applications**, Newcastle, DE, Aug 17-19, 2021.
- Certificate in **Suspension/Granular Rheology**, *The Society of Rheology*, Raleigh, NC, Oct 19-20, 2019.