

Mohammad Nooranidoost

Curriculum Vitae

Department of Mathematics
Florida State University
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PROFESSIONAL APPOINTMENTS

- 2022-present **Dean's Postdoctoral Scholar**
Department of Mathematics, Florida State University, Tallahassee, FL
Mentor: Dr. Nick Cogan
Research focus: *Mathematical Modeling of Biofilm matrix's Spatiotemporal Organization*
- 2021-2022 **Postdoctoral Scholar**
Department of Mathematics, Florida State University, Tallahassee, FL
Mentors: Dr. M. Yousuff Hussaini & Dr. Nick Cogan
Research focus: *Bayesian Estimation of Biofilm Viscoelasticity*

EDUCATION

- Dec. 2020 **Ph.D. in Mechanical Engineering**
University of Central Florida, Orlando, FL
Advisor: Dr. Ranganathan Kumar
Dissertation title: *Cell Encapsulation in Microfluidic Channels*
- Aug. 2016 **M.Sc. in Mechanical Engineering**
Koç University, Istanbul, Turkey
Advisor: Dr. Metin Muradoglu
Thesis title: *Effects of Viscoelasticity on Droplet Dynamics in Microfluidic Systems*
- Aug. 2013 **B.Sc. in Aerospace Engineering**
Sharif University of Technology, Tehran, Iran

RESEARCH INTERESTS

My research focuses on studying biological and rheological complex systems, including biofilm, bio-microfluidics, and soft matter via mathematical modeling and numerical simulations.

PEER-REVIEWED JOURNAL ARTICLES

* co-corresponding author

8. **Nooranidoost M***, Cogan N, Stoodley P, Gloag E, Hussaini M. Bayesian estimation of *Pseudomonas aeruginosa* viscoelastic properties based on creep responses of wild type, rugose, and mucoid variant biofilms. *Biofilm* (2023): 100133.
7. Palogan B, **Nooranidoost M**, Kumar R, Bhattacharya S. Single T-junction formation in a flow-focusing microchannel. *Microfluidics and Nanofluidics* 26.10 (2022): 81.
6. **Nooranidoost M**, Kumar R. Deformation of an encapsulated leukemia HL60 cell through sudden contractions of a microfluidic channel. *Micromachines* 12.4 (2021): 355.
5. **Nooranidoost M**, Kumar R. Improving viability of leukemia cells by tailoring shell fluid rheology in constricted microcapillary. *Scientific Reports* 10.1 (2020): 1-11.
4. **Nooranidoost M**, Izbassarov D, Tasoglu, S, Muradoglu M. A computational study of droplet-based bioprinting: effects of viscoelasticity. *Physics of Fluids* 31.8 (2019): 081901.
3. **Nooranidoost M**, Haghshenas M, Muradoglu M, Kumar R. Cell encapsulation modes in a flow focusing microchannel: effects of shell fluid viscosity. *Microfluidics and Nanofluidics* 23.3 (2019): 31.
2. **Nooranidoost M**, Kumar R. Geometry effects of axisymmetric flow focusing microchannels for single cell encapsulation. *Materials* 12.17 (2019): 2811.
1. **Nooranidoost M**, Izbassarov D, Muradoglu M. Droplet formation in a flow focusing configuration: effects of viscoelasticity. *Physics of Fluids* 28.12 (2016): 123102.

RESEARCH EXPERIENCE

Department of Mathematics, Florida State University

Postdoctoral Scholar

- 2023-present Developing a multiphase solver to model spatiotemporal organization of biofilm matrix as a gel-mix and its interaction with the fluid flow
- 2023-present Developing a multi-scale computational platform to describe the communication and interactions between bacterial strains that influence biofilm development
- 2023-present Formulating a mathematical model to predict cell population per droplet during the cell encapsulation process in microfluidic channels using theoretical fluid dynamics and statistics
- 2021-2023 Developed a Bayesian framework to estimate the viscoelastic properties of different biofilm variants based on creep-recovery experimental data

Department of Mechanical Engineering, University of Central Florida

Graduate Research Assistant

- 2019-2020 Integrated PIV experiments and COMSOL multiphysics simulations to explain the droplet formation process in hydrophobic/ hydrophilic microfluidic channels
- 2019-2020 Incorporated a theoretical cell survival model into numerical simulations to quantify the deformation and viability of encapsulated cells in constricted microchannels
- 2018-2019 Characterized different cell encapsulation modes and studied statistics of cell count per droplet under different physical conditions
- 2017-2019 Developed an in-house multiphase code to simulate the encapsulation of single cells and migration of the encapsulated cells as a three-phase system

Department of Mechanical Engineering, Koç University

Graduate Research Assistant

- 2015-2016 Developed an in-house code to simulate a droplet-based bio-printing system and quantified the effects of bioink viscoelasticity on the viability of cells during the printing process
- 2013-2015 Developed a front-tracking based in-house code to simulate the generation of droplets in flow-focusing geometries for viscoelastic systems

TEACHING EXPERIENCE

Department of Mathematics, Florida State University

Instructor of Record

- Calculus II Fall 2023, Spring 2023, Fall 2022 (two sections per semester with class size \approx 20)

Department of Mechanical Engineering, University of Central Florida

Graduate Teaching Assistant

- Thermodynamics Fall 2018, Spring 2017 (class size \approx 300)

Department of Mechanical Engineering, Koç University

Graduate Teaching Assistant

- Fluid Mechanics Spring 2016, Fall 2013

Lab Instructor

- Physics Lab II Fall 2015, Fall 2014
- Physics Lab I Spring 2015, Spring 2014

Department of Aerospace Engineering, Sharif University of Technology

Teaching Assistant

- Aerodynamics I Fall 2012
- Mechanics of Materials Fall 2011
- Dynamics Fall 2011
- Engineering Statics Spring 2011

Invited Talks

15. **Nooranidoost M**, A Bayesian framework for estimating biofilm rheology *Bi-College Math/Stat Colloquium*, Haverford College, Haverford, PA (2023).
14. **Nooranidoost M**, A multiscale mathematical model for biofilm structure and viscoelasticity *Mathematics Colloquium*, Florida State University, Tallahassee, FL (2023).
13. **Nooranidoost M**, A mathematical model for biofilm viscoelasticity and its spatiotemporal organization *Applied Mathematics Group Seminar*, Georgia State University, Atlanta, GA (2023).
12. **Nooranidoost M**, Bayesian estimation of *Pseudomonas aeruginosa* viscoelastic properties. *Biomathematics Graduate Seminar*, Florida State University, Tallahassee, FL (2021).

Contributed Talks

11. **Nooranidoost M**, Cogan N. Mathematical Modeling of Spatio-temporal Organization of Biofilm Structure. *Annual Meeting of the American Physical Society, March Meeting*, Las Vegas, NV (2023).
10. **Nooranidoost M**, Cogan N, Hussaini M. Bayesian estimation of *Pseudomonas aeruginosa* viscoelastic properties. *Annual Meeting of the American Physical Society, March Meeting*, Chicago, IL (2022).
9. **Nooranidoost M**, Kumar R. Deformation and viability of an encapsulated cell through a microfluidic contraction. *The 72nd Annual Meeting of the American Physical Society, Division of Fluid Dynamics*, Seattle, WA (2019).
8. **Nooranidoost M**, Izbassarov D, Kumar R. Cell encapsulation in a flow focusing microchannel: effects of viscoelasticity. *The 71st Annual Meeting of the American Physical Society, Division of Fluid Dynamics*, Atlanta, GA (2018).
7. Izbassarov D, **Nooranidoost M**, Muradoglu M. Effects of viscoelasticity on droplet-based bioprinting. *The 71st Annual Meeting of the American Physical Society, Division of Fluid Dynamics*, Atlanta, GA (2018).
6. **Nooranidoost M**, Haghshenas M, Muradoglu M, Kumar R. Cell-encapsulating droplet formation in a flow focusing configuration. *The 70th Annual Meeting of the American Physical Society, Division of Fluid Dynamics*, Denver, CO (2017).
5. **Nooranidoost M**, Izbassarov D, Muradoglu M. The effects of viscoelasticity in a microfluidic flow focusing configuration. *6th International Workshop on Bubble and Droplet*, Potsdam, Germany (2015).
4. **Nooranidoost M**, Izbassarov D, Muradoglu M. Direct numerical simulations of viscoelastic effects on drop formation in a flow focusing configuration. *International Conference on Advances in Applied and Computational Mechanics*, Izmir, Turkey (2015).
3. **Nooranidoost M**, Izbassarov D, Muradoglu M. A computational modeling of viscoelastic effects on droplet formation in a flow focusing configuration. *8th Ankara International Aerospace Conference*, Ankara, Turkey (2015).

Poster Presentations

2. **Nooranidoost M**, Cogan N. Modeling biofilm spatiotemporal organization as a gel-mix. *50th Annual Meeting of Society of Mathematical Biology*, Columbus, OH (2023)
1. **Nooranidoost M**, Cogan N, Hussaini M. A Bayesian Approach to study *Pseudomonas aeruginosa* viscoelasticity. *The Mathematics of Soft Matter*, IMSI Institute, Online (2022)

MENTORING EXPERIENCE

Undergraduate Research Opportunity Program, Florida State University

- 2022-present Lorenzo Lindquist, Undergraduate student in statistics
Project title: Simulating Soccer Seasons Using Bi-variate Poisson Distributions
Outcome: One poster in the *FSU 2023 Undergraduate Research Symposium*
- 2022-2023 Elona Berisha, Undergraduate student in biomathematics and pre-med program
Project title: Statistical Modeling of Cell Encapsulation
Outcome: One poster in the *FSU 2023 Undergraduate Research Symposium*

Department of Mechanical Engineering, University of Central Florida

- 2019-2020 Bryan Palogan, Ph.D. student in mechanical engineering
Project title: Droplet generation in hydrophobic/hydrophilic microchannels
Outcome: One peer-reviewed article in *Microfluidics and Nanofluidics*

SERVICE EXPERIENCE

American Physical Society (APS)- Division of Biological Physics (DBIO)

- 2022-present Serving as ad-hoc member of DBIO Engagement Committee
- 2024 Co-organizing a focus session for the APS March Meeting titled:
Collective Behavior in Cell Biology
- 2023 Chaired a focus session during the APS March Meeting titled:
Intrinsically Disordered Proteins and Non-equilibrium Processes
- 2022 Co-organized the DBIO postdoc networking event titled:
Making the most of your postdoc training

Postdoctoral Association (PDA), Florida State University

- May. 2022 - May 2023 (Advisory Board committee member)
- Dec. 2022 - May 2023 (Senior advisor)
- Jun. 2022 - Nov. 2022 (President)
- Aug. 2021 - May 2022 (Vice-president)
- 2021-present Working on initiatives including paid parental leave, newsletter, and buddy program
- 2022 - 2023 Served as ad-hoc member of FSU Office of Postdoctoral Affairs Travel Award Committee
- 2023 Co-chaired the postdoc Spring Event titled: *Academic and Industry CV Workshop*
- 2022 Co-chaired the postdoc Spring Event titled: *Planning Your Career After a Postdoc*

College of Engineering and Computer Science, University of Central Florida

- 2021-2022 Judged the UCF-CECS Senior Design Virtual Showcase.

Journal Peer-Reviewer

- 2017-present Peer-reviewed ten journal articles for *Physics of Fluids*

PROFESSIONAL DEVELOPMENT & CERTIFICATIONS

- 2019-2020 **Preparing Tomorrow's Faculty**
The Faculty Center for Teaching & Learning, University of Central Florida
Completed a twelve-week program on preparing future and academic leaders to teach at the collegiate level. Designed course materials for Fluid Mechanics course.
- 2022-2023 **Diversity & Inclusion Certificate**
Diversity & Inclusion Council, Florida State University
Completed six training sessions and a project on strategic areas around diversity. Learned how to create a welcoming and inclusive campus for all.
- 2022 **Data Science Bootcamp**
The Erdos Institute
Completed a one-month online workshop and a project on data collection, analysis, and cleaning as well as supervised and unsupervised learning, and neural network.
Project title: Classifying Emotions from Audio

OTHER CONFERENCES & WORKSHOPS ATTENDED

2023	Finding Your Inner Modeler VI, Birmingham, AL
2023	A Short Course on Computing Soft Matter Across Scales, APS March Meeting, Las Vegas, NV
2023	Annual Meeting of National Postdoctoral Association, Philadelphia, PA
2022	Understanding Rules of Life Post-Doc Incubator, NSF (Virtual)
2021	A Short Course in Systems Biology, University of California, Irvine (Virtual)
2021	Montana Biofilm Meeting, Center for Biofilm Engineering (Virtual)
2021	Annual Meeting of Society for Industrial and Applied Mathematics (Virtual)
2021	Annual Meeting of Society for Mathematical Biology (Virtual)

SKILLS

Technical Skills

Mathematical modeling, Bayesian Inference, Physical/theoretical model development, Computational Fluid Dynamics, Multiphase Flows, Interfacial flows, Front-tracking method, Rheological flows, Microfluidics, Level-set method, Biofluids, Technical writing.

Computer Skills

FORTRAN, MATLAB, Python, OpenFOAM, COMSOL Multiphysics, Linux, L^AT_EX, Microsoft Office

HONORS, AWARDS, & FUNDING

2023	NSF Travel support to attend FYIM VI
2023	Landahl Travel Award, Society of Mathematical Biology
2022	FSU Postdoctoral Scholar's Career Development Travel Award
2020	UCF Open Access Publishing Fund
2018-2019	UCF Student Government Association travel fund
2017-2020	UCF CSE scholarship during the doctoral program
2017-2019	UCF Presentation Fellowship
2013-2016	TUBITAK scholarship during master's program
2015	Koç University research award
2015	COST action MP1106 travel grant

PROFESSIONAL MEMBERSHIPS

American Physical Society (APS)
Society of Mathematical Biology (SMB)
Society of Industrial and Mathematics (SIAM)
National Postdoctoral Association (NPA)