Mehryar Jannesari Ghomsheh

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EDUCATION

University of Tehran — *Tehran, Iran*
M.S. in Biomechanical Engineering — *Sep. 2020 - Present*
GPA: 19.05/20.00 (4.0/4.0)

University of Tehran — *Tehran, Iran*
B.S. in Mechanical Engineering — *Sep. 2020*
GPA: 17.76/20.00 (3.82/4.00), Last 2year GPA: 18.51/20.00 (4.0/4.0)

RESEARCH INTERESTS

- Thermal-Fluid Science
- Computational Fluid Dynamics
- Complex Fluids
- Transport Phenomena in Biological Systems
- Targeted Drug Delivery
- Microfluidics
- Deep Learning and Neural Networks

RESEARCH EXPERIENCES

M.S. Thesis: The investigation of hydrodynamic interactions between swimming microorganism in the gastric mucus for improvement on drug delivery — *Aug. 2021 - Present*
Advisor: Dr. A. Jafari — *University of Tehran*
- Researched Brinkman and Bi-viscous models to model the gastric mucus
- Scrutinized the H. pylori bacteria locomotion in the gastric mucus

Graduate Research Assistant — *Jan. 2021 - Present*
Computational Non-Newtonian Fluid Mechanics Lab, Head: Dr. A. Jafari — *University of Tehran*
- Developed a framework for coupling of MATLAB and COMSOL software to carry out 3D DNS of particle lateral movement in straight microchannels
- Detected the particle trajectory in a square-wave microchannel for different Reynolds numbers by post-processing the experimental results and comparing with the obtained numerical results
- Generated a particle tracing module for the application of targeted drug delivery in cardiovascular disease
- Analyzed the blood rheology by viscoelastic, shear-thinning, and thixotropic models
- Explored the dynamics of different micro-swimmers for the application of targeted drug delivery
- Examined a micro-swimmer trajectory in high Reynolds number flows through FSI simulation with Arbitrary Lagrangian-Eulerian (ALE) method

B.S. Thesis: modeling and optimization of a condenser with phase change material used in electric vehicle heat pump cycle — *Jan. 2020 – Sep. 2020*
Advisor: Prof. F. Kowsary — *University of Tehran*
- Observed and optimized the thermal performance of PCM heat exchanger in real driving conditions
- Designed an optimal PCM heat exchanger
- Integrated the optimal PCM heat exchanger into the EV model to extend its mileage

ACADEMIC PROJECTS

Inertial Lift on a Spherical Particle in Newtonian Fluid and Xanthan Gum Solutions — *Mar. 2021 – July 2021*
Instructor: Dr. A. Jafari
- Calculated position-dependent inertial lift forces for a single particle in the Poiseuille flow of Newtonian fluids and Xanthan gum solutions to detect the equilibrium positions
- Assessed the validity of Power-law model for Xanthan gum solutions based on obtained shear-rate profiles

Stability Analysis of a Laminar Wall Jet in a Decelerating External Flow — *Mar. 2021 – July 2021*
Instructor: Prof. K. Sadeghy
- Devised a golden-section optimization algorithm to optimize the pressure gradient parameter
- Carried out temporal stability analysis of the wall jet using spectral methods based on similarity profiles of velocity

A Novel Bubble-driven Micromixer/Micropump Based on Thermal-inkjet Technology *Oct. 2020 – Mar. 2021*

Instructor: Dr. V. Bazargan

- Designed an extensible square-wave microchannel toward reaching an optimal design
- Coupled Level Set and Volume-Of-Fluid (CLSVOF) method for bubble-fluid and fluid-fluid interface tracking

Analysis of the Flow through a Converging-Diverging Duct (Stenosis) *Oct. 2020 – Nov. 2020*

Instructor: Dr. V. Bazargan

- Obtained different velocity profiles based on stenosis size
- Calculated the pressure drop as a function of stenosis height and length for different Reynolds numbers

Two-dimensional Incompressible Laminar Navier-Stokes Equations in C++ *Nov. 2019 – Jan. 2020*

Instructor: Dr. A. Jalali

- Developed a SIMPLE algorithm with finite-volume discretization to solve the NS equations
- Formulated the equations of stream function and vorticity to compare with the SIMPLE algorithm

A Two-dimensional Inverse Heat Conduction Problem to Estimate the Surface Heat Flux *Oct. 2019 – Dec. 2019*

Instructor: Prof. F. Kowsary

- Developed a framework for coupling of MATLAB and ANSYS Fluent software to solve and optimize the temperature profile
- Generated genetic and conjugate gradient optimization algorithms

Two-dimensional Incompressible Laminar Energy Equation in C++ *Oct. 2019 – Dec. 2019*

Instructor: Dr. A. Jalali

- Programmed explicit and implicit Euler time advance schemes to compare the stability
- Applied approximate factorization to solve the linear system of implicit discretization

Implementation of Elliptic Equations' Solving Methods in C++ *Sep. 2019 – Nov. 2019*

Instructor: Dr. A. Jalali

- Second-order finite difference discretization of Poisson's and Laplace's equations
- Implementation of Gauss-Seidel, P-SOR, and L-SOR formulations

PUBLICATIONS

- "Inertial lift on a particle in a straight microchannel of Newtonian, Power-law, and Carreau-Yasuda fluids: a simulation study toward optimized particle separation (*to be submitted*), under supervision of Dr. A. Jafari"
- Hanie Rezaei, **Mehryar Jannesari Ghomsheh**, Farshad Kowsary, Pouria Ahmadi, "Performance assessment of a range-extended electric vehicle under real driving conditions using novel PCM-based HVAC system," Sustainable Energy Technologies and Assessments, 47(101527), 2021.

TEACHING EXPERIENCES

Teaching Assistant, Fluid Mechanics II *Sep. 2021 – Present*

School of Mechanical Engineering, University of Tehran

- Assigning and grading homework and quizzes

Teaching Assistant, Optimization of Mechanical Systems *Sep. 2020 – Jan. 2021*

School of Mechanical Engineering, University of Tehran

- Assigned and graded homework and projects, lectured additional course materials

Teaching Assistant, Heat Transfer I *Sep. 2020 – Jan. 2021*

School of Mechanical Engineering, University of Tehran

- Assigned and graded homework and projects

Teaching Assistant, Fluid Mechanics II *Sep. 2019 – Jan. 2020*

School of Mechanical Engineering, University of Tehran

- Assigned and graded homework and quizzes, held weekly office hours for a class of 30 students

Private Tutor, Mathematics *Mar. 2019 – Apr. 2019*

Math Home, Tehran, Iran

- Tutored 10 high school students attending International Mathematics Competition (IMC)

SELECTED COURSES

Graduate Level

- Non-Newtonian Fluid Mechanics (19.75/20.00), Instructor: Dr. A. Jafari
- Advanced Fluid Mechanics (19.75/20.00), Instructor: Prof. K. Sadeghy
- Fluid Mechanics in Biological Systems (19.0/20.0), Instructor: Dr. V. Bazargan
- Advanced Mathematics (17.1/20.0), Instructor: Dr. H. M. Darian
- Physiology (20.0/20.0), Instructor: Dr. B. Seifi

Undergraduate Level

- Computational Fluid Dynamics (19.5/20.0), Instructor: Dr. A. Jalali
- Optimization of Mechanical Systems (20.0/20.0), Instructor: Prof. F. Kowsary

TECHNICAL SKILLS

Engineering	ANSYS Workbench, COMSOL Multiphysics, SolidWorks
Programming	MATLAB, Python, C/C++, HTML/CSS (beginner level)
Operating Systems	Windows, Linux (beginner level)
Other	Microsoft Office, LaTeX

HONORS AND AWARDS

Deep Learning and Neural Networks with Keras, Certification *Apr. 2021*
IBM, Coursera

Machine Learning, Certification *Mar. 2021*
Stanford Online, Coursera

Full Scholarship, M.S. Program, Exceptional Talents *July 2020*
School of Mechanical Engineering, University of Tehran, Tehran, Iran

Ranked Among Top 10% of the Entry *July 2020*

School of Mechanical Engineering, University of Tehran, Tehran, Iran

Full Scholarship, B.S. Program, Iranian University Entrance Exam *Aug. 2016*
School of Mechanical Engineering, University of Tehran, Tehran, Iran

488th Place among 162,879 Participants, Iranian University Entrance Exam (Konkur) *2016*

LANGUAGE

English: Professional Working Proficiency

- TOEFL iBT: 103 (Reading: 29/30, Listening: 26/30, Speaking: 23/30, Writing: 25/30) *Oct. 2020*

Persian: Native

REFERENCES*

Dr. A. Jafari
Assistant Professor of Mechanical Engineering,
University of Tehran

- PHD Graduated from EPFL

azadeh.jafari@ut.ac.ir

Prof. F. Kowsary
Professor of Mechanical Engineering, University of Tehran

- PHD Graduated from Virginia Polytechnic Institute

fkowsari@ut.ac.ir

*Others available upon request