

## EDUCATION

### University of Tehran

M.S. in Biomechanical Engineering  
GPA: 19.05/20.00 (4.0/4.0)

Tehran, Iran  
Sep. 2020 - Present

### University of Tehran

B.S. in Mechanical Engineering  
GPA: 17.76/20.00 (3.82/4.00), Last 2year GPA: 18.51/20.00 (4.0/4.0)

Tehran, Iran  
Sep. 2020

## RESEARCH INTERESTS

- Computational Fluid Dynamics
- Complex Fluids
- Transport Phenomena in Biological Systems
- Microfluidics and Lab-on-a-Chip Systems
- Targeted Drug Delivery
- Heat Transfer
- Deep Learning, Neural Networks, and Optimization

## PUBLICATIONS

- 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.
- **Mehryar Jannesari Ghomsheh**, Azadeh Jafari, Denis Funfschilling, "Inertial lift forces on a particle in a straight microchannel of Newtonian, Power-law, and Carreau-Yasuda fluids: a simulation study toward optimized particle separation," Phys. Fluids, Nov. 2021 (*under review*).

*In Preparation:*

- **Mehryar Jannesari Ghomsheh**, Azadeh Jafari, Denis Funfschilling, "A novel passive geometry for inertial focusing of different-sized particles," Sci. Rep.

## RESEARCH EXPERIENCES

### M.S. Thesis: Hydrodynamic interactions between swimming micro-organisms in complex media for improvement on targeted drug delivery

Advisor: Dr. A. Jafari

Aug. 2021 - Present

University of Tehran

- Studied the gastric mucus environment
- Examined the locomotion of a self-propelled micro-swimmer in the gastric mucus

### Graduate Research Assistant

Computational Non-Newtonian Fluid Mechanics Lab, Head: Dr. A. Jafari

Jan. 2021 - Present

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
- 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 phase change material heat exchanger in electric vehicle air conditioning system

Advisor: Prof. F. Kowsary

Jan. 2020 – Sep. 2020

University of Tehran

- Observed the thermal performance of PCM heat exchanger in real driving conditions and different outside temperatures
- Designed an optimal PCM heat exchanger
- Integrated the optimal PCM heat exchanger into the EV model to extend its mileage

## SELECTED PROJECTS

---

### **Inertial Lift Forces on a 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 for two different Reynolds numbers
- Assessed the validity of Power-law model for Xanthan gum solutions based on the 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
- Implemented a 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)**

*Sep. 2020 – Oct. 2020*

Instructor: Dr. V. Bazargan

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

### **Two-dimensional Incompressible Laminar Navier-Stokes and Energy Equations in C++**

*Oct. 2019 – Jan. 2020*

Instructor: Dr. A. Jalali

- Developed a SIMPLE algorithm with finite-volume discretization to solve the NS equations and verified the results by solving the same problem with the equations of stream function and vorticity
- Programmed explicit and implicit Euler time advance schemes for the energy equation to compare their stability

## TEACHING EXPERIENCES

---

(All in School of Mechanical Engineering, University of Tehran)

Responsibilities: assigning and grading homework, quizzes, and projects and lecturing additional course materials

**Teaching Assistant, Advanced Fluid Mechanics, Instructor: Dr. A. Jalali**

*Sep. 2021 – Present*

**Teaching Assistant, Fluid Mechanics II, Instructor: Dr. A. Jafari**

*Sep. 2021 – Present*

**Teaching Assistant, Optimization of Mechanical Systems, Instructor: Prof. F. Kowsary**

*Sep. 2020 – Jan. 2021*

**Teaching Assistant, Heat Transfer I, Instructor: Prof. F. Kowsary**

*Sep. 2020 – Jan. 2021*

**Teaching Assistant, Fluid Mechanics II, Instructor: Dr. H. Rezvantaleb**

*Sep. 2019 – Jan. 2020*

## 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
- Heat Transfer I (17.0/20.0), Instructor: Prof. F. Kowsary

## CERTIFICATIONS

### Deep Learning and Neural Networks with Keras

IBM, Coursera

Apr. 2021

### Machine Learning

Stanford Online, Coursera

Mar. 2021

## TECHNICAL SKILLS

Engineering	ANSYS Workbench, COMSOL Multiphysics, SolidWorks
Programming	MATLAB, Python, C/C++, HTML/CSS
Operating Systems	Windows, Linux
Other	Microsoft Office, L <sup>A</sup> T <sub>E</sub> X, Adobe Premiere Pro

## HONORS AND AWARDS

### Ranked Among Top 10% of the Entry

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

July 2020

### Full Scholarship, M.S. Program, Exceptional Talents

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

July 2020

### Full Scholarship, B.S. Program, Iranian University Entrance Exam

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

Aug. 2016

### 306<sup>th</sup> 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)
- GRE General: 315 (Verbal: 150/170, Quantitative: 165/170)

Oct. 2020

Nov. 2021

### Persian: Native

## REFERENCES

### Dr. A. Jafari

Assistant Professor of Mechanical Engineering,  
University of Tehran

- Ph.D. Graduated from EPFL

[azadeh.jafari@ut.ac.ir](mailto:azadeh.jafari@ut.ac.ir)

### Dr. V. Bazargan

Assistant Professor of Mechanical Engineering,  
University of Tehran

- Ph.D. Graduated from University of British Columbia

[vbazargan@ut.ac.ir](mailto:vbazargan@ut.ac.ir)

### Prof. F. Kowsary

Professor of Mechanical Engineering, University of Tehran

- Ph.D. Graduated from Virginia Polytechnic Institute and State University

[fkowsari@ut.ac.ir](mailto:fkowsari@ut.ac.ir)

### Prof. K. Sadeghy

Professor of Mechanical Engineering, University of Tehran

- Ph.D. Graduated from University of Toronto

[sadeghy@ut.ac.ir](mailto:sadeghy@ut.ac.ir)