Mehryar Jannesari Ghomsheh

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# education

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

# Research interests

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| * Computational Fluid Dynamics * Complex Fluids * Transport Phenomena in Biological Systems * Microfluidics | * Targeted Drug Delivery * Heat Transfer * Deep Learning, Neural Networks, and Optimization |

# publications

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| * 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](https://www.sciencedirect.com/science/article/abs/pii/S2213138821005385). |
| * **Mehryar Jannesari Ghomsheh**, Azadeh Jafari, “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 (*to be submitted*). |
| * **Mehryar Jannesari Ghomsheh**, Azadeh Jafari, “A novel passive geometry for inertial focusing of different-sized particles,” Sci. Rep. (*to be submitted*). |

# research Experiences

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| M.S. Thesis: The investigation of hydrodynamic interactions between micro-swimmers in the gastric mucus for improvement on targeted drug delivery using machine learning | Aug. 2021 - Present |
| Advisor: Dr. A. Jafari | University of Tehran |
| * Researched Brinkman model to simulate the gastric mucus environment * 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 * 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 used in electric vehicle air conditioning system | Jan. 2020 – Sep. 2020 |
| Advisor: Prof. F. Kowsary | 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

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| 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 * 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

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| (All in School of Mechanical Engineering, University of Tehran) Responsibilities: assigning and grading homework, quizzes, and projects and lecturing additional course materials | |
| 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. Rezvantalab | Sep. 2019 – Jan. 2020 |

# selected courses

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| 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

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| Deep Learning and Neural Networks with Keras | Apr. 2021 |
| IBM, Coursera |  |
| Machine Learning | Mar. 2021 |
| Stanford Online, Coursera |  |

# technical skills

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| Engineering | ANSYS Workbench, COMSOL Multiphysics, SolidWorks |
| Programming | MATLAB, Python, C/C++, HTML/CSS |
| Operating Systems | Windows, Linux |
| Other | Microsoft Office, LATEX, Adobe Premiere Pro |

# honors and awards

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| Ranked Among Top 10% of the Entry | July 2020 |
| School of Mechanical Engineering, University of Tehran, Tehran, Iran |  |
| Full Scholarship, M.S. Program, Exceptional Talents | 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 |  |
| 306th Place among 162,879 Participants, Iranian University Entrance Exam (Konkur) | 2016 |

# language

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| English: Professional Working Proficiency |  |
| * TOEFL iBT: 103 (Reading: 29/30, Listening: 26/30, Speaking: 23/30, Writing: 25/30) | Oct. 2020 |
| Persian: Native |  |

# References

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| Dr. A. Jafari | Prof. F. Kowsary |
| Assistant Professor of Mechanical Engineering, University of Tehran | Professor of Mechanical Engineering, University of Tehran |
| * Ph.D. Graduated from EPFL | * Ph.D. Graduated from Virginia Polytechnic Institute and State University |
| [azadeh.jafari@ut.ac.ir](mailto:azadeh.jafari@ut.ac.ir) | [fkowsari@ut.ac.ir](mailto:fkowsari@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) |  |