HAOTIAN JIA

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Summary

- PhD candidate in Mechanical Engineering with a focus on Heat Transfer, Fluid Mechanics, and Mass Transfer, expertise in analytical problem-solving with a profound understanding of the fundamental physics associated with these fields.
- 5+ years of professional experience in scientific research, proficiency in data processing, visualization, and analysis.
- Proficient in presenting reports and information; Experienced in working in team-based environments, collaborating effectively, and possessing strong communication skills in English and Mandarin.

Education

Tufts University — Medford, MA
PhD Candidate (6th year), Mechanical Engineering (GPA: 3.82/4.0) — *Sep 2020 – Present*

Tufts University — Medford, MA
MS Mechanical Engineering — *Sep 2018 – Present*

Beijing Forestry University — Beijing, China
BS Mechanical Design, Manufacturing, and Automation — *Sep 2014 – Jun 2018*

Employment

Department of Mechanical Engineering, Tufts University — Medford, MA
Research Assistant — *Sep 2019 – Present*

Department of Mathematics, Imperial College London — London, UK
Research Assistant, Global Research Assistant Program (GRAP) — *Jun 2022 – Aug 2022*

Mechanical Design, Prototyping & Testing

Permeability measurement of aerogel | *funded by NSF award 153060*

- Designed, constructed, and tested an experimental apparatus to precisely measure aerogel permeability through two independent methods. The apparatus utilized CO_2 under pressures up to 1850 PSI and temperatures of 50°C.
- Improved the existing experimental method for direct permeability measurement and developed a non-destructive aerogel permeability testing method using Duhamel's theorem.
- Developed several custom programs using LabVIEW and MATLAB for data collection and post-processing, respectively.

Jet-impingement enhanced freeze drying | *funded by NSF STTR Phase I award 2014881*

- Optimized Collaborator's (Aerogel Technologies, LLC.) patented aerogel freeze-drying process by designing, constructing, commissioning, and utilizing a first-of-its-kind drying system demo, resulting in a 75% reduction in production time.
- Developed dehumidification process for compressed air flow, achieving a dew point as low as -40°C while maintaining a high mass flow rate of up to 12.7 SCFM.

Microchannel fabrication | *Funded by NSF award 2140033 (Ongoing)*

- Designed and fabricated PDMS microchannel with complex sidewall geometry using the method of SU-8 Soft-lithography in Tufts Micro and Nano Fabrication Facility (class 1000 cleanroom). conducted several Preliminary Experiments using micro-PIV

Modeling, Simulation & Theoretical Research

Inertial Effects on the Flow Resistance of Axial Groove Heat Pipes

- Improved an which simplifies a 3-dimensional 2-phase flow problem into 2D several 2D Modeled and solved the partial differential equations governing 2-phase flow by employing asymptotic expansion techniques and utilizing MATLAB finite element method solvers.

2 Degree-of-Freedom Planar Robot Arm Design & Control

- Customized a National Instruments myRIO using the LabVIEW FPGA Module to design and compare multiple control methods for a 2-degree-of-freedom planar robot arm.

Relevant Courses

- **Transport Phenomena** | Fluid Mechanics, Thermal-fluid Transport, Microfluidics, heat transfer, High Reynolds Number Flow, Analytic Transport Phenomena, Thermal Management Of Electronics
- **Numerical Modeling** | Applied Mathematics for Engineers, Numerical Analysis, Simulation for Mechanical Engineer

Technical Skills

- **Heat Transfer and Fluid Flow Modeling** | Expertise in conduction, forced convection, , high Reynolds number flow.

  don microfluidics, thermal management for electronics. analytic tools Experienced in modeling for heat sinks, heat pipes, fans, impinging jets, and heat exchangers, etc.
- **Numerical Modeling, Simulation & Analysis** | Proficient in numerical analysis tools, applying Finite Element Method (FEM/FEA) and skilled in designing custom numerical solvers. Proficient using the MATLAB Partial Differential Equation Toolbox. Computational Fluid Dynamics, Proficient in using Computational Fluid Dynamics tools (Ansys Fluent and COMSOL)
- **Mechanical Design & Manufacturing** | 8+ years of experience utilizing 2D & 3D CAD software (SolidWorks, Solid Edge, AutoCAD). Expertise in various manufacturing methods and experience in G-code and MasterCAM for CNC manufacturing.
- **Experimental Data Acquisition** | Developed multiple test and measurement systems utilizing National Instrument hardware (NI-DAQ) within the LabVIEW environment to collect and preprocess data. Expertise in measurement techniques for fluid flow (vortex, micro-PIV) and heat transfer with proficiency in error analysis.
- **Data Processing, & analysis** | 5+ years of experience using using MATLAB processing and visualizing scientific data, using Excel and. Proficient in utilizing illustrative post-processing techniques to support project presentation via Inkscape and PowerPoint
- **Document Drafting & Academic writing** | Proficient in utilizing Microsoft Word and LaTeX for drafting project summaries, proposals, data management plans, and other documents related to scientific research.
- **English Communication Skills** | Successfully delivered several presentations and collaborated with multi-disciplinary teams and industry partners in STTR (Small Business Technology Transfer) projects for early-stage research, development, and deployment initiatives.

Leadership & Collaboration Experience

PR Department, Association Federation of Beijing Forestry University — Beijing, China
Vice Minister — *Jul 2015 – Sep 2016*

- Represented the university and its students in a diverse range of events organized by other universities in the Beijing area, fostering collaboration and networking opportunities.

LvFangCheng Electroacoustic Club, Art Troupe of Beijing Forestry University — Beijing, China
President — *Nov 2016 – Nov 2017*

- Coordinated with performance venues, organized several music events to provide opportunities for student performers.
- Oversaw the management of the club, including recruitment, rehearsals, and scheduling of performances.

Publications

- Jia, H., Hodes, M., and Kirk, T., "Inertial Effects on the Adiabatic-Section Flow Resistance of Axial Groove Heat Pipes." In progress for submission to the *Journal of Fluid Mechanics*.
- Mayer, M., Jia, H., Adler, J., Hu, X., and Hodes, M., "Enhanced Lubrication and Pumping of Flow in Superhydrophobic Microchannels via Chromocapillarity." In progress for submission to the *Journal of Fluid Mechanics*.
- Jia, H., Dinh, H., Hodes, M., Griffin, J., Mayer, M., Diorio, M., and Karamanis, G., "An Apparatus to Measure Permeability of Aerogels by Redundant Methods." In progress for submission.
- Jia, H., Karamanis, G., Abolorunke, F., Dinh, H., Griffin, J., and Hodes, M., "Jet-Impingement-Enhanced Ambient-Pressure Freeze Drying Of Aerogels." In progress for submission.

Conference Talks & Presentations

- **10th International Congress on Industrial and Applied Mathematics (2023)** | Presented a minisymposia talk titled *"Inertial Effects on the Adiabatic-Section Flow Resistance of Axial Groove Heat Pipes"*
- **The Red Lotus Project** | Presented a series of talks at video-conference events and mini-symposia to mathematicians at Imperial College London, promoting interdisciplinary collaboration in the field of surface engineering, with a focus on microfabrication and photochemistry applications.
- **Online Aerogel Seminar 2020** | Presented a talk titled *"Permeability of Aerogels under Supercritical CO_2 Conditions"*
- **Tufts International Center 2019 Workshop** | Participated in *"Transitioning to Graduate School"*, a panel discussion.