Haobo Zhao

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Education

Johns Hopkins University, Baltimore, MD *Sep. 2023 - Present*
Master in Mechanical Engineering
Advisor: Dr. Rajat Mittal and Dr. Jung-Hee Seo

Relevant Coursework: Comuptational Fluid Dynamics, Fluid Dynamics I & II, Convection, Numerical Method, Turbulence, Multiphase Flow

Southern Illinois University, Carbondale, IL *2022-2023*
B.S. in Aviation Technologies (Dual Degree with SAU) GPA: 3.81/4.0
Graduated Magna cum Laude, Dean's List: Fall 2022, Fall 2023

Shenyang Aerospace University, Shenyang, China *2019-2023*
Bachelor in Aircraft Propulsion Engineering GPA: 3.8/4.0
National Scholarship (2021, top 1% in Department)
SAU First Class Scholarship (Fall 2020, Fall 2021, Spring 2022)

Research Interests

I am interested in the simulation and application of bio-fluids in various aspects. I have experience in coordinating with medical teams to solve real problems in patients using CFD, as well as experience in flow simulation and analysis in bio-ducts and algorithm development.

Computational Fluid Dynamics (CFD), Immersed Boundary Methods, Multiphase Flows, Biological Flows, Multi-Physics Modeling

Research Experience

- **Johns Hopkins University** *Sep. 2023 - Present*
  Master Thesis (Advisor: Dr. Rajat Mittal, Dr. Jung-Hee Seo) – Department of Mechanical Engineering
  - Developed an imaging data-based CFD model of the pancreatic duct (PD) using the CFX solver, validated against clinical data.
  - Created a pipeline for generating patient-specific PD models using cine-MRI data.
  - Formulated a theoretical flow model to predict pressure variations along the PD.
  - Collaborated with medical teams to validate the results for clinical applications.
  - Simulated PD flow mechanisms and correlated pressure drop with ERCP-related pain scores.

Engineering Projects

Adaptive Multi-bypass Propulsion System *Team Leader, May 2022*

- Proposed an aero-engine improvement plan for a multi-electric design, focusing on power generation and energy efficiency.
- Integrated an adaptive three-bypass system with the XA100 prototype, enhancing heat management and stealth.

Electromagnetic Flowmeter Design *Team Leader, September 2021*

- Designed and tested an electromagnetic flowmeter for conductive media, addressing signal amplification and interference for accurate measurement.

Power Allocation Planning in Time Trials (2022 MCM/ICM) *Paper Writer & Programmer, February 2022*

- Developed an OmPD model for optimizing power curves and energy distribution in time trials, published in Heilongjiang Science.

Honors and Awards

Major Honors:

- **National Scholarship (2021)**: Awarded to top 1% in department for academic excellence.
- **First Prize, National Mathematics Competition (China, 2020)**: Top 8% of participants.
- **Third Prize, Mechanics Competition of Zhou Peiyuan (China, 2021)**: Recognized for excellence in mechanics.
- **Top 5 in China, iCAN Innovation Contest (2021)**: Ranked 5th out of 3000 teams nationally (Group Award).

Mathematics:

- First Prize, National Mathematics Competition for College Students (Top 8%), 2020
- First Prize, Mathematical Modeling Competition in Liaoning Province, 2021
- Second Prize, Mathematical Modeling Competition in Liaoning Province, 2020
- Second Prize, National Mathematics Competition for College Students, 2021
- Third Prize, China CUMCM (Contemporary Undergraduate Mathematical Contest in Modeling), 2021
- Third Prize, MathorCup Undergraduate Mathematical Modeling Challenge, 2021
- Second Prize, Asia Pacific Mathematical Contest in Modeling, 2020
- Second Prize, Mathematical Contest in Modeling of Three Provinces in Northeast China, 2020

Physics:

- Third Prize, Mechanics Competition in Honour of Zhou Peiyuan, 2021
- First Prize, Physics Experiment Competition in Liaoning Province, 2020

Innovation and Design:

- iCAN Innovation Contest (Finalist), Top 5 in China, 2021
- Third Prize, China College Students' "Internet+" Innovation and Entrepreneurship Competition, 2021
- Second Prize, The 6th China International "Internet+" College Student Innovation and Entrepreneurship Competition SAU Selection, 2020
- First Prize, SAU Future Engine Design Competition

Technical Skills

- **Programming:** C++, Python, MATLAB, html
- **Software:** ANSYS CFX, ANSYS Fluent, COMSOL Multiphysics, OpenFOAM, SolidWorks
- **Tools:** Git, LaTeX, Microsoft Office

Volunteering & Teaching

Core Team Member *May 2022 - Dec. 2022*
SIU-SAU University Collaboration Program Student Helper

- Counseled students from Shenyang Aerospace University in the SIU-SAU Collaboration program.
- Negotiated with SIU's Center for International Education for course arrangements.
- Provided emotional, mental, and financial support in collaboration with professional counselors.

Student Teacher *Dec. 2019 - Dec. 2021*
Shenyang Aerospace University

- Tutored Calculus I & II and College Physics I, including study sessions and final exam reviews.
- Assisted 66 students, improving understanding and academic performance.
- Created final review materials, including mind maps and instructional videos to aid retention.