

Weixuan Li

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EDUCATION

Johns Hopkins University (JHU), USA

Sept. 2023 – Present

Master of Science in Engineering (Expected), Dept. of Mechanical Engineering

- Cumulative GPA: 4.0/4.0

Massachusetts Institute of Technology (MIT), USA

Sept. 2022 – May 2023

MIT-SUSTech special student program (Non-degree), Dept. of Mechanical Engineering

- Cumulative GPA: 5.0/5.0

Southern University of Science and Technology (SUSTech), China

Sept. 2019 – June 2023

Bachelor of Science, Theoretical and Applied Mechanics, Dept. of Mechanical and Aerospace Engineering

- Cumulative GPA: 3.86/4.0; Class Rank: 1/21

PUBLICATIONS

[1] W. Li, S. Kuhar, J.H. Seo, R. Mittal. "Food Digestion in the Stomach after Bariatric Surgery: Insights from Multiphase Flow Modeling." *Submitted to APS Division of Fluid Dynamics Meeting* (2024).

[2] Krinos, A.I., Shapiro, S.K., Li, W., Haley, S.T., Dyhrman, S.T., Dutkiewicz, S., Follows, M.J., and Alexander, H. (2024). "Intraspecific diversity in thermal performance determines phytoplankton ecological niche." *bioRxiv*, 2024-02. Also submitted to *Ecology Letters* (Under review).

RESEARCH EXPERIENCE

Computational Modeling of Stomach Surgery Using Multiphase Flow Simulations

Sept. 2023 - Present

Flow Physics and Computation Lab, supervised by Prof. Rajat Mittal

JHU, Baltimore, MD, USA

📦 Project 1: Food Digestion in the Stomach after Bariatric Surgery: Insights from Multiphase Flow Modeling

Jan. 2024 - Present

- Submitted an abstract to the APS Division of Fluid Dynamics Meeting (2024).
- Investigated the impact of laparoscopic sleeve gastrectomy, a type of bariatric surgery that alters stomach geometry and gastric motility, on digestion inside the stomach.
- Developed a modified stomach model to reflect post-surgical conditions by resecting a portion of the stomach and altering its contraction pattern from bilateral to unilateral due to the non-contracting resected side.
- Conducted multiphase flow simulations on the modified stomach model and compared the results with those of the stomach before sleeve gastrectomy.
- Quantified the effects of sleeve gastrectomy on the transport, mixing and emptying functions of the stomach.

📦 Project 2: Vicar3D Code Validation with Multiphase Flow Simulations

Sept. 2023 - Dec. 2023

- Utilized Vicar3D, a custom code package developed within the research group for simulating multiphase flows, to validate its performance against established benchmarks.
- Conducted literature reviews and selected a relevant study titled *Simulation of the falling droplet by the lattice Boltzmann method* to benchmark the Vicar3D code.
- Reproduced the 2D falling droplet simulations from the study, and the results from Vicar3D align well with the literature at specific time points, validating the accuracy and reliability of the Vicar3D code.

Thermal Niche Modeling and Bioinformatics of Marine Phytoplankton

Sept. 2022 - May 2023

Mick Follow's Group, supervised by Prof. Mick Follows

MIT, Cambridge, MA, USA

- Co-authored a manuscript submitted to Ecology Letters, currently under peer review, where I contributed as the third author.
- Conducted literature reviews on marine ecosystem modeling, focusing on the interactive effects of environmental factors such as temperature on marine phytoplankton, particularly coccolithophores.
- Analyzed Darwin ecosystem model outputs to visualize and interpret the thermal range variations of different *Gephyrocapsa huxleyi* strains across global ocean regions using Julia.
- Led the creation of Figure 4 (panels B-F) in the manuscript, which involved probabilistic modeling and projection of the environmental distributions of *Gephyrocapsa huxleyi* strains based on thermal response data.

Large eddy simulation (LES) in Lattice Boltzmann method for turbulent channel flow

Sept. 2021 - May 2023

Wang's Research Group, supervised by Prof. Lian-Ping Wang

SUSTech, Shenzhen, China

- Awarded the Excellent Undergraduate Thesis Award at SUSTech.
- Secured funding of RMB 10,000 (\$1,500) for this project from the National Innovation and Entrepreneurship Training Program for College Students.
- Conducted advanced theoretical analysis and applications of LES-LBM for turbulent flows, with a focus on insights from "Large Eddy Simulation for Incompressible Flows" by Pierre Sagaut.
- Designed and implemented FORTRAN90 codes to apply subgrid-scale and wall models to a custom code package developed within the research group.
- Enhanced the original numerical simulation package by integrating the Smagorinsky sub-grid scale model and the Musker wall model, improving its efficiency while maintaining accuracy in simulating turbulent channel flows.

AWARDS AND FELLOWSHIPS

Johns Hopkins Mechanical Engineering Distinguished Master's Fellowship Aug. 2023

- Selected as one of the most excellent master's students to receive the fellowship (only 3-4 students each year), which provides 50% tuition coverage during the master's program.

Thomas Sheridan Award | MIT Department of Mechanical Engineering Student Award May 2023

- Distinguished as one of a select group of undergraduate and graduate students recognized for outstanding achievements.

Excellent Graduate for Exceptional Performance June 2023

- Honored as the top graduate among all undergraduates at SUSTech.

Excellent Undergraduate Thesis Award June 2023

- Recognized for the outstanding undergraduate thesis at SUSTech titled "Large-eddy Simulation with Wall Model in Lattice Boltzmann Method for Turbulent Channel Flow".

ASC22 Student Supercomputer Challenge | Second Class Prize May 2022

- Awarded as a member of the Southern University of Science and Technology team for outstanding performance in the world's largest supercomputing competition.

Merit Student Scholarship | First Class Nov. 2019, 2020, 2021

- Awarded to the top 5% of undergraduate students for exceptional academic performance.

TECHNICAL SKILLS

Programming Languages: Fortran90, Python, Java, Julia

Software and Tools: Paraview, Tecplot, MATLAB, ANSYS, Solidworks, Blender, Linux, High-Performance Computing (HPC) systems

WORK EXPERIENCE

Teaching Assistant, Statistical Learning for Engineers Sept. 2024 – Present

- Selected as a TA based on outstanding performance in the course.
- Working on grading homework assignments, exams, and projects, holding office hours, and managing Piazza.

Student Assistant, SUSTech Sept. 2019 – May 2020

- Organized meetings for tutor group leaders, managed college branding activities, and revised student manuals.

LEADERSHIP AND ACTIVITIES

Secretary-General of the Student Union, Shuren College, SUSTech Sept. 2020 – Sept. 2021

- Organized events, drafted documents, managed files, and coordinated with other organizations.

Vice President of the Table Tennis Club Sept. 2020 – Sept. 2021

- Authored publicity articles, supported the President in organizing events, and contributed to the club's recognition as one of the annual top 10 clubs in the university.

Volunteer Instructor, STEAM+ Team Sept. 2019 – Dec. 2019

- Taught primary students in the community to use 3D printers through volunteer classes.
- Contributed to the project being recognized as the "Annual Outstanding Public Welfare Project" by the SUSTech Volunteer Association.