Zongze Li

Phone: 813-546-5773 | Email: zongze.li@outlook.com | Location: Orlando, FL
Website: Personal Page | LinkedIn | Google Scholar | GitHub

EDUCATIONAL BACKGROUND

Ph.D. in Mechanical Engineering at University of South Florida, Tampa, FL **GPA: 3.96/4.00** **09/2019 ~ Present**
- Courses: Computational Fluid Dynamics, Advanced Computational Fluid Mechanics, Biological Fluid Mechanics, Engineering Physiology, etc.

M.S. in Mechanical Engineering at University of South Florida, Tampa, FL **GPA: 3.95/4.00** **09/2017 ~ 05/2019**
- Courses: Advanced Fluid Mechanics, Advanced Engineering Math II, Advanced Materials, Advanced Mathematics, Applied Elasticity, Robotic Systems, Finite Element Methods, etc.

B.Eng. in Renewable Energy at University of Shanghai for Science and Technology, Shanghai, China **GPA: 3.21/4.00** **09/2011 ~ 09/2015**
- Courses: Introduction to Computer Science, Images Processing and Creation (Adobe), Mechanical Engineering Drawing, Computer Drawing (AutoCAD), Advanced Computer Language (C), General Chemistry, Linear Algebra, Experiments of Electronics, Engineering Fluid Mechanics, Engineering Thermodynamics, Heat Transfer, Refrigeration Principles, Physics, etc.

SKILLS

Simulation/Modeling	ANSYS, COMSOL, Computational Fluid Dynamics (CFD), Finite Element Method (FEM), Fluid-Structure Interaction (FSI), FLUENT, Lattice Boltzmann Method (LBM), Palabos
Programming	Algorithm Development, C++, HTML, High Performance Computing (HPC), JAVA, Linux, Microsoft Visual Studio, MATLAB, Message Passing Interface (MPI), Python
Geometry design and processing	Adobe, AutoCAD, Blender, ImageJ, MeshLab, Paraview, SolidWorks
Laboratory	2D Laser Cutting, 3D Printing, Particle Image Velocimetry (PIV)

PROJECTS

Bio-Inspired CFD: Fluid-Structure Interaction (FSI) Modeling of a Marine Animal **09/2022 ~ Present**
- Sole contributor to the development of an FSI framework using the lattice Boltzmann method (LBM) within computational fluid dynamics (CFD) field.
- Designed and implemented, using VS Code, a high-fidelity FSI solver (C++ code package) capable of modeling diverse flow–structure cases, validated with excellent agreement against analytical solutions.
- Optimized the fluid–solid interface algorithm and parallelized the code using MPI in Linux environment to improve computational efficiency.

Research outcomes are under final revision for journal publication.

Boundary Algorithm Improvements for Lattice Boltzmann Method **09/2022 ~ Present**
- Developed two novel algorithms for off-lattice Dirichlet boundary conditions, achieving reduced error and enhanced stability compared with existing approaches.
- Conducted a comprehensive parameter study to offer insights and guidance for fellow researchers exploring similar methodologies.

This work is currently undergoing final revisions for journal publication.

CFD Modeling of Air Circulation by Ceiling Fan Using ANSYS FLUENT **04/2021**
- Applied ANSYS FLUENT to simulate indoor airflow dynamics as part of an advanced CFD course at the University of South Florida.
- Modeled two bedroom configurations with varying aspect ratios, including cases with and without wall windows.
- Analyzed airflow patterns induced by ceiling fans operating in clockwise and counterclockwise directions.

Patient-Specific Aortic Flow CFD Modeling using LBM Coupled with Windkessel Model **08/2019 ~ 09/2022**
- Performed patient-specific aortic flow simulations with <5% error using the lattice Boltzmann method (LBM).
- Integrated Windkessel boundary conditions with LBM to achieve physiologically realistic outflow conditions.
- Generated high-resolution clinical flow images with potential diagnostic applications.
- Tool used: Palabos (C++), Blender, MeshLab, Paraview, MATLAB Global Optimization Toolbox.
- Published work (see Publications).

Design and Testing of Experimental Langmuir Turbulence Facilities **08/2018 ~ 06/2019**
- Designed a custom LED lighting system in SolidWorks to illuminate Langmuir turbulence patterns, reducing cost by 75% while maintaining comparable performance to laser-based devices.
- Applied ANSYS FLUENT to evaluate structural stability, predicting tank displacement and improving stability.
- Replicated Langmuir turbulence phenomena in the laboratory, advancing understanding of oceanic dynamics and fluid mechanics.
- Published in thesis work.

6-Degree-of-Freedom (6-DOF) Robotic Arm Design **04/2018**
- Designed a 6-DOF robotic arm in AutoCAD, integrating 5 revolute joints and 1 prismatic joint for dynamic motion and flexibility.
- Developed MATLAB code to animate and simulate robotic arm kinematics.
- Prepared a detailed academic report including system conceptualization, CAD illustrations, and code documentation.

Thermal Environment Analysis and Optimization in PC Chassis **02/2015 ~ 06/2015**
- Conducted CFD simulations in ANSYS FLUENT to analyze thermal environments inside a PC chassis.
- Identified optimal fan orientation and placement to improve CPU heat dissipation efficiency.
- Implemented design adjustments that enhanced overall cooling performance, improving system reliability and component longevity.
- Undergraduate thesis project.

PROFESSIONAL EXPERIENCE

Reviewer, Physics of Fluids **09/2024 ~ Present**

Papers reviewed:
- Evaluating the effectiveness of the modified multi-scale multi-physics coupled model for solid oxide fuel cells: A comparative analysis
- The Helical Vortex Arising from Aberrant Right Subclavian Artery Induces the Occurrence of Dissection Tears

Reviewer, CFD Letters **02/2024 ~ Present**

Papers reviewed:
- A Numerical Study of a CFD Parameter Model and the Effects of Different Height Dimensions inside a Soilless Greenhouse
- CFD Analysis of the Influence of Geometric Parameters on Aerodynamics of a Cone-Cylinder Flight Body

Lecturer for ANSYS FLUENT Workshop, Engineers without Border, University of South Florida **11/2023**

Responsibilities included:

- Provided a comprehensive overview of ANSYS FLUENT, highlighting its diverse capabilities and applications across various engineering fields.
- Explained the mathematical background of the software, elucidating the correlation between software settings and mathematical equations.
- Held a guided simulation session, familiarizing participants with FLUENT's interface and workflow.
- Shared learning materials and references, empowering participants to continue their skill development after the workshop.

Research Assistant, University of South Florida **09/2019 ~ Present**

As a researcher in the field of complex physical phenomena modeling, my skills and achievements include:

- Computational Methods: Lattice Boltzmann Method (LBM), Fluid–Structure Interaction (FSI), custom boundary algorithm development.
- Programming & HPC: C++, MPI, Linux environment; code development and parallelization using VS Code.
- Simulation Software: Palabos (primary CFD framework), ANSYS FLUENT, COMSOL.
- Geometry & Modeling: MeshLab, Blender, SolidWorks, AutoCAD for model reconstruction and geometry modifications
- Data Analysis & Visualization: MATLAB (Global Optimization Toolbox), Paraview for optimization, post-processing, and visualization

PUBLICATIONS AND CONFERENCES

Presented at 3rd Florida Fluid Symposium (FFS) **05/2024**
Title: An Immersed Boundary - Lattice Boltzmann Method for Fluid-Structure Interaction Modeling

Publication in Computers & Fluids **06/2023**
Title: A fast approach to estimating Windkessel model parameters for patient-specific multi-scale CFD simulations of aortic flow

Presented at 2nd Florida Fluid Symposium (FFS) **05/2023**
Title: Two accurate off-lattice pressure boundary algorithms in lattice Boltzmann method

Presented at 75th American Physics Society Division of Fluid Dynamics (APSDFD) **11/2022**
Title: An improved off-lattice algorithm for the open boundary in the lattice Boltzmann method

Presented at 1st Florida Fluid Symposium (FFS) **05/2022**
Title: A fast approach to estimating Windkessel model parameters for patient-specific multi-scale CFD simulations of aortic flow

Poster in Division of Comparative Biomechanics Division of Vertebrate Morphology (DCB-DVM) **11/2021**
Title: Daphnia magna distribution under the influence of Langmuir circulation

Presented at 74th American Physics Society Division of Fluid Dynamics (APSDFD) **11/2021**
Title: A fast approach to determine resistances and compliances of the Windkessel models in the simulation of aortic flow

Master thesis publication in University of South Florida **06/2019**
Title: Design and Testing of Experimental Langmuir Turbulence Facilities

SUPPLEMENTARY EXPERIENCE

Teaching Assistant, University of South Florida **09/2019 ~ Present**

As a teaching assistant in Mechanical Lab, Heat Transfer, and Computational Concepts, I am responsible for the following duties:

- Host recitation classes to address student inquiries and offer supplementary explanations.
- Hold regular office hours to support students with course content and assignments.
- Evaluate and grade homework assignments, quizzes, and exams.
- Proctor exams to ensure academic integrity and fair testing conditions.

Invited Speaker, U.S. Education without Borders **03/2022**

As an invited speaker for "U.S. Education without Borders," I delivered a talk aimed at introducing and promoting life and educational experiences in the United States to Chinese students. This online event provided insights and guidance for aspiring students seeking educational opportunities abroad.

Key responsibilities and achievements:

- Shared firsthand insights into life as an international student in the United States, offering personal anecdotes and experiences to resonate with the audience.
- Leveraged insights from a friend in admissions to provide detailed guidance on admission procedures and requirements for prospective students.
- Provided practical advice on selecting universities and devising strategic academic goals.
- Emphasized the advantages of international education in the United States, highlighting cultural enrichment and career opportunities.

HONORS AND AWARDS

AutoCAD Drawing Competition of the city of Shanghai, China (The 3rd Group Prize) **06/2012**
AutoCAD Drawing Competition of University of Shanghai for Science and Technology (The 1st Prize) **05/2012**
Shanghai Computer Language Certificate for C++ **03/2012**

MISCELLANEOUS

Volunteer in the CARRT robotic system lab, university of South Florida, FL **06/2018 ~ 09/2018**
"Shuang Xia" voluntary activity in nursing home, Shanghai, China **03/2013 ~ 05/2013**
"Sunny Home" voluntary activity in elementary school, Shanghai, China **03/2013 ~ 05/2013**
Shanghai "Chang Bai" community service, Shanghai, China **03/2013 ~ 04/2013**
Acoustics Engineer in "Jiang Pan" Drama Club, Shanghai, China **09/2012 ~ 01/2013**
Iowa Youth Leadership International, Des Moines, IA **07/2011 ~ 08/2011**