

Zongze Li

zongze.li@outlook.com | Tampa, FL | Work Authorization: OPT/CPT (F1 visa)

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	ANSYS, COMSOL, Computational Fluid Dynamics (CFD), Finite Element Method (FEM), Fluid-Structure Interaction (FSI), FLUENT, Lattice Boltzmann Method (LBM), Palabos
Programming	Algorithm Development, C++, 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

Fluid-Structured Interaction (FSI) Modeling of a Marine Animal **09/2022 ~ Present**
As the primary contributor to Fluid-Solid Interaction (FSI) modeling for the Lattice Boltzmann Method (LBM) in Computational Fluid Dynamics (CFD) field, I've achieved the following milestones:

- Developed an accurate rigid body solver for governing rigid body motion in fluid, presenting perfect agreement with analytical solutions during validation.
- Conducted in professional coding in C++ with MPI on Linux, optimizing the efficiency of the fluid-solid interface.

The ongoing development of this solver is intended for studying complex biological phenomena such as flying and swimming.

Boundary Algorithm Improvements for Lattice Boltzmann Method **09/2022 ~ Present**

The Lattice Boltzmann Method (LBM) has emerged as a prominent tool for Computation Fluid Dynamics (CFD) simulation, gathering increased attention over the past two decades. Despite its popularity, algorithms addressing open boundaries still remain elusive. My achievements in this project include:

- Developed two algorithms for off-lattice Dirichlet boundary conditions, demonstrating reduced error and improved stability comparing to existing methods.
- Conducted a comprehensive parameter study to offer insights and guidance for fellow researchers exploring similar methodologies.

This work is currently undergoing final revisions for publication.

CFD Modeling of Air Circulation by Ceiling Fan Using ANSYS FLUENT **04/2021**

This project was completed as part of Advanced Computational Fluid Dynamics class at the University of South Florida, focusing on investigating the influence of ceiling fan direction on indoor air circulation. Key aspects of the project include:

- Utilized ANSYS FLUENT simulation to model indoor airflow dynamics.
- Examined two bedrooms with different aspect ratios, including variations with and without windows on the bedroom walls.
- Analyzed airflow patterns generated by ceiling fans rotating clockwise and counterclockwise.

Patient-Specific Aortic Flow CFD Modeling by LBM Coupled with Windkessel Model **08/2019 ~ 09/2022**

In the realm of cardiovascular research, understanding hemodynamics within the aorta is crucial for comprehensive analysis of related diseases. In this project, I've achieved the following highlights:

- Attained realistic patient-specific aortic flow CFD simulation with less than 5% error.
- Integrated two models (Windkessel model and LBM boundary algorithm) into one simulation, demonstrating realistic outflow conditions.
- Produced high-resolution clinical images potential for disease diagnosis.

This work has been published and can be found in my publications. Throughout the project, I utilized the open-source package Palabos, written in C++, employed geometry software including Blender, MeshLab, and Paraview for aortic modifications, and optimized Windkessel parameters using MATLAB's Global Optimization Toolbox.

Design and Testing of Experimental Langmuir Turbulence Facilities **08/2018 ~ 06/2019**

Langmuir turbulence, an important phenomenon in ocean dynamics, was investigated in a fluid laboratory at the university of South Florida. In this project, I achieved the following highlights:

- Developed a custom LED lighting system using SolidWorks to accurately illuminate experimental Langmuir turbulence patterns, reducing cost by 75% while maintaining similar illuminating performance to expensive laser devices.
- Utilized ANSYS FLUENT software for comprehensive structural stability tests, predicting experimental tank displacement and enhancing stability by adding two horizontal alloy beams.
- Successfully replicated Langmuir turbulence phenomena in the fluid laboratory, contributing to understanding of oceanic dynamics and fluid mechanics.

This work has been published in my thesis.

6-Degree-of-Freedom (6-DOF) Robotic Arm Design **04/2018**

This project was completed as part of Robotic System class at University of South Florida, involving the design, coding, and analysis of a 6-degree-of-freedom (6-DOF) robotic arm system. My responsibilities include:

- Utilized AutoCAD to design a 6-DOF robotic arm, integrating 5 revolute joints and 1 prismatic joint to achieve dynamic motion and flexibility.
- Developed MATLAB code to animate and simulate the movements of the robotic arm.
- Created a comprehensive academic report outlining the conceptualization, CAD illustrations, and code explanation.

Thermal Environment Analysis and Optimization in PC Chassis **02/2015 ~ 06/2015**

This is my undergraduate thesis project. I focused on optimizing CPU performance through efficient heat management. Key highlights of the project include:

- Utilized ANSYS FLUENT to conduct comprehensive simulations of thermal environments within PC chassis.
- Identified optimal direction and placement of fan to enhance CPU heat dissipation efficiency.
- Implemented strategic adjustments to improve overall system cooling performance, resulting in enhanced reliability and longevity of computer components.

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

During the review process, I assessed pre-published papers in computational fluid dynamics (CFD) for publication in CFD Letters, evaluating their innovation and quality and providing feedback to enhance clarity, relevance, and scholarly rigor.

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

During the review process, I assessed pre-published papers in computational fluid dynamics (CFD) for publication in CFD Letters, evaluating their innovation and quality and providing feedback to enhance clarity, relevance, and scholarly rigor.

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 achievements include:

- Achieved realistic patient specific aortic flow simulation (CFD) within 5% error.
- Contributed potential visualization tools for clinicians to diagnose cardiovascular diseases (biomedical applications).
- Invented two boundary algorithms for lattice Boltzmann method (LBM), enabling less error simulations.
- Developed C++ code package for simulating rigid body motion in fluid (FSI), aiming to solve complex biological problems such as flying and swimming.

In our research, we primarily used Palabos for simulations and C++ with MPI for code development on Linux, employing Microsoft Visual Studio as the IDE. We also utilized ANSYS FLUENT and COMSOL for validation, and MeshLab, AutoCAD, SolidWorks, and Blender for geometry modification. Post-processing analysis was performed using MATLAB and Paraview.

PUBLICATIONS AND CONFERENCE

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.

Technician, "HUICHENG" Corporation, Changchun, China

10/2015 ~ 01/2016

Key responsibilities:

- Spearheaded the construction and maintenance of the "WeChat" public platform for commercial promotion.
- Produce video and music content using Adobe products, enhancing brand visibility and audience engagement.

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
