Zimeng Jia

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Education

University of Southern California — **Los Angeles, US**
PhD student, Mechanical Engineering — 08/2025 – now

Imperial College London — **London, UK**
Master of Aeronautical Engineering — 09/2019 – 06/2024

U.S. Equivalency: M.Eng./B.Eng.
Notable Courses: *Aerodynamics, Mathematics, Computational Fluid Dynamics, Control Systems, High Performance Computing, Application of Computational Fluid Dynamics, Artificial Intelligence for Aerospace Engineers, Optimization*

Academic Experience

Final Year Project: Characterizing Synthetic Turbulent Flow Using PyFR 10/2023 – 06/2024
Supervisor: Prof. Peter Vincent

- Utilized the novel Synthetic Eddy Method (SEM) developed by *Prof. Vincent's* group to determine mesh-resolution requirements for varying turbulent intensities, integral length scales, and viscosities. Evaluated optimal object placement distances to achieve fully developed flow and formally characterized the decay properties of the resulting turbulence.
- Conducted strong scaling tests to assess performance improvements and scalability of PyFR on GPU clusters.
- Identified and resolved hidden numerical errors, major bug that prevented from assessing flow's homogeneity
- Identified critical improvement to ensure proper turbulent energy cascade and eliminate streaks in the flow
- This work has been shared with industrial partners, and will be shared with the broader PyFR community.

Application of CFD: Simulation of Turbulence over DF102 Airfoil 03/2024 – 05/2024
Taught by Prof. Spencer Sherwin

- Conducted high-fidelity 2D and quasi-3D simulations using advanced spectral/hp element methods to analyze the aerodynamic performance of and flow separation phenomena over DF102 airfoil at various angle of attack using Nektar++.
- Completed a comprehensive report comparing experimental data with simulation results from XFOIL, STAR-CCM+, and 2D and quasi-3D simulations conducted in Nektar++. The analysis evaluated the performance, accuracy, and capability of each computational tool.

High Performance Computing: Parallelization and Optimization of 2D Lid-Driven Cavity Solver 02/2024 – 03/2024
Taught by Dr. Chris Cantwell

- Developed C++ code to extend a serial numerical solver for parallel execution, solving the vorticity-stream function formulation of the incompressible Navier-Stokes equations using the finite difference method.
- Implemented domain decomposition using MPI for distributed-memory parallelism and integrated OpenMP for shared-memory parallelism, allowing multi-threading within each MPI process.
- Conducted unit testing, scaling analysis to improve the effectiveness of the parallelization and performance profiling for optimization.

CFD: DNS of a 2D Heat Exchanger based on Circular Cylinders 02/2022
Taught by Prof. Sylvain Laizet

- Developed and modified a finite-difference code in FORTRAN to solve the 2D compressible Navier-Stokes equations, incorporating features for mesh generation, and robust handling of initial and boundary conditions.
- Implemented 2nd-order Adams-Bashforth and 3rd -order Runge-Kutta time integration schemes, along with 4th-order spatial discretization.

Design Coursework: Business Jet 10/2021 – 04/2022
Taught by Dr. Errikos Levis, and Prof. Lorenzo Iannucci

- Led a team of 6 in designing a business jet, including conceptual design, preliminary airframe design and detailed structure design.
- Performed comprehensive aerodynamic analysis, alongside detailed structural design. Responsibilities included load distribution, shear force, bending moment, and torque analysis, as well as structural and composite manufacturing design.

Professional Experience

Siemens Digital Industries Software **Towcester, UK**
CFD Software Engineering & Testing Internship 07/2022 – 02/2023

- Development mainly focused on heat transfer, turbulent modeling, fluid mechanics, and gas turbine implementation. One of several significant achievements is that I improved accuracy of heat duty simulation results by 45.27% compared to the customer's in-house tool.
- Conducted research on molten salt mixture's thermophysical properties under various conditions, and managed database for the properties using SQL, contributing to the Green Energy Power Generation Industry initiatives.
- Explored the implementation of an asynchronous direct solver for banded linear systems to enhance the performance of an existing CFD pressure solver.

Skills

Relevant Laboratories: Incompressible aerodynamics and panel method validation for high aspect ratio swept wing; Supersonic wind tunnel experiment and visualization of compressible flows

Programming Skills: MATLAB, Python, C#, SQL, FORTRAN, and C++

Simulation Tools: PyFR, Nektar++, Star-CCM+, XFOIL, SOLIDWORKS, 3DEXPERIENCE, Abaqus, Ansys, Gmsh, ParaView

Language abilities: Chinese (Mandarin), English

Hobbies and Interests

Private Pilot Training: I am pursuing private pilot license training to fly single-engine light aircraft. I find great enjoyment in flying, as it combines the exhilaration of flight with the challenge of navigating visually without relying on GPS, while also broadening my knowledge of meteorology.

Playing the Flute: Outside of academics, I have had a long-standing passion for playing the flute since Grade 2. As a member of my high school concert band, I performed regularly and enjoyed the creativity and relaxation music brings. It continues to be a meaningful outlet that supports both my well-being and creative thinking.

Climbing Mountains: I enjoy mountain climbing for both its physical and mental benefits. The rhythm of walking in nature sparks creativity, while the climbs build perseverance and patience.