

Jonathan Woo

Updated: March 18, 2025

Education

University of California, Los Angeles

Doctor of Philosophy in Mathematics

September 2025 — June 2030 (anticipated)

University of California, Los Angeles

Bachelor of Science in Mathematics of Computation

September 2020 — August 2024

Research Experience

Undergraduate Researcher

UCLA Computational and Applied Mathematics REU

Los Angeles, USA

June 2023 — August 2023

Mentors: Andrea Bertozzi, Sarah Burnett, Lingyun Ding

- Studied gravity-driven particle-laden viscous thin-films down an incline through physical experiments, computational simulations, data analysis, and theoretical exploration.
- Explored and compared continuum models for transport of particles and liquid derived from a diffusive flux model and a suspension balance model

Publications

1. Wing Pok Lee*, **Jonathan D. Woo***, Luke F. Triplett*, Yifan Gu*, Sarah C. Burnett, Lingyun Ding, Andrea L. Bertozzi, A comparative study of dynamic models for gravity-driven particle-laden flows, Applied Mathematics Letters, Volume 164, 2025, 109480, ISSN 0893-9659, <https://doi.org/10.1016/j.aml.2025.109480>. (*equal contribution)

Posters and Presentations

Gravity-driven Particle-laden Free Surface Flow - A Comparison of Models

May 2024

UCLA Undergraduate Research and Creativity Showcase

- Presented comparisons between a diffusive flux model and suspension balance model in the context of thin-films.
- Numerical simulation data from each model reveal that both models agree well with experimental data and that the two models minimally differ from each other.

Phase transitions in highly concentrated particle-liquid thin films

November 2023

76th Annual Meeting of the Division of Fluid Dynamics

- Experimentally investigated phenomenon in gravity-driven particle-laden flows down an incline where liquid-particle suspensions transition from fluid-like behavior to solid-like behavior.
- Discovered quantitative dependence of front speed and fluid layer thickness on parameters such as the inclination angle, particle diameter, particle volume fraction, densities, and viscosity.

Modeling polydisperse particle-laden flow down an incline

November 2023

76th Annual Meeting of the Division of Fluid Dynamics

- Modelled behavior of particle-laden flows with finitely many particle species of differing size as well as a continuous distribution of particle sizes.
- Developed model consisting of a system of hyperbolic conservation laws whose fluxes were determined by an auxiliary ordinary differential equation system (for the finite species case) or an integro-differential equation (for the continuous size distribution case).
- Numerically simulated and performed comparisons between physical experimental data and numerical data.

Projects

Computer Graphics Class Project

October 2022 — December 2022

Department of Computer Science, UCLA

- With two other group members, built an interactive computer graphics demonstration found at <https://bruinkart.glitch.me/>.
- Implemented 3D graphics with lighting, shading, models, and physics in JavaScript.

Relevant Coursework

Undergraduate Math Courses

- **Linear Algebra**, Grade: A- (Honors), A+
- **Abstract Algebra**, Grade: A (Honors), A (Honors), A
- **Real Analysis**, Grade: A (Honors), A
- **Complex Analysis**, Grade: A (Honors)
- **Differential Geometry**, Grade: B+
- **Numerical Analysis**, Grade: A+ (Honors), A (Honors)
- **Ordinary Differential Equations**, Grade: A+
- **Probability Theory**, Grade: A-
- **Stochastic Processes**, Grade: A
- **Optimization**, Grade: A

Graduate Math Courses

- **Applied ODEs**, Grade: B+
- **Applied PDEs**, Grade: B+
- **Numerical ODEs**, Grade: A+
- **Numerical PDEs**, Grade: A
- **Finite Element Method**, Grade: A+

Undergraduate Computer Science Courses

- **Machine Learning**, Grade: A-
- **Computer Graphics**, Grade: A
- **Algorithms and Data Structures**, Grade: B
- **Software Construction**, Grade: A-
- **Computer Organization and Architecture**, Grade: A+

Work Experience

Math Tutor

Mathanimum Learning Center

Rancho Santa Margarita, CA, USA

January 2025 — Present

- Provided exceptional instruction/tutoring services to students.
- Evaluate and correct student work and homework.
- Interact and motivate students.
- Work collaboratively with team members to deliver the best learning experience for students.

PIC Lab Assistant

UCLA Programming in Computing Lab

Los Angeles, CA, USA

September 2023 — June 2024

- Maintained proper operations of computing lab through cleaning, organizing, and assisting.
- Assisted lab patrons in troubleshooting and programming.

Skills

Programming: Intermediate knowledge of C/C++, Python, JavaScript, Java, HTML, CSS, LaTeX; basic knowledge of MATLAB, R, and shell scripting

Python Packages: NumPy, SciPy, PyTorch, Matplotlib

Languages: English (Native), Korean (Elementary Proficiency)