Jonathan Woo

Updated: February 9, 2025

Education

University of California, Los Angeles September 2025 — June 2030 (anticipated)
Doctor of Philosophy in Mathematics

University of California, Los Angeles September 2020 — August 2024
Bachelor of Science in Mathematics of Computation

Research Experience

Undergraduate Researcher Los Angeles, USA
UCLA Computational and Applied Mathematics REU 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 Divison 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 Divison 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 Rancho Santa Margarita, CA, USA
Mathanisum Learning Center 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 Los Angeles, CA, USA
UCLA Programming in Computing Lab 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)