Joseph Nakao

Curriculum Vitae

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Education

University of Delaware — Newark, DE
Ph.D. Applied Mathematics (in progress) — *Expected 2023*
Advisor: Jingmei Qiu

University of Delaware — Newark, DE
M.S. Applied Mathematics — *2018–2020*
Advisor: Jingmei Qiu

Seattle University — Seattle, WA
B.S. Applied Mathematics — *2014–2018*
Advisors: Yen-Lin Han (Mechanical engineering) and Katie Oliveras (Mathematics)

Awards

- Winter Research Symposium Best Poster Award, University of Delaware — February 2022
  Voted best poster at the annual Winter Research Symposium hosted by the University of Delaware Department of Mathematical Sciences. ($500 award)
- Baxter-Sloyer Graduate Teaching Award, University of Delaware — May 2021
  "Given to a graduate student teaching assistant, in mathematical sciences, who has demonstrated superior effectiveness in teaching, and in the performance of their responsibilities." ($300 award)
- Seth Trotter Book Collecting Contest, University of Delaware — June 2019
  Placed first in the book collecting contest put on by the Friends of the University of Delaware Library, and entered into the National Student Book Collecting Contest. ($1000 award)
- Wynne Alexander Guy Award, Seattle University — June 2018
  "Given in grateful acknowledgment of a graduating mathematics major whose extraordinary contribution to the department always went above and beyond what was expected. Named to honor beloved teacher Mrs. Guy, who performed extraordinary service to the Mathematics department and Seattle University for 30 years."

Publications

Journals and Conference Proceedings

J. Nakao, J. Chen, and J.-M. Qiu, "An Eulerian-Lagrangian Runge-Kutta finite volume (EL-RK-FV) method for solving convection and convection-diffusion equations", *Submitted.* (link here)

J. Nakao and Y.L. Han, "Preliminary simulated results modeling a dynamic heating cancer ablation probe", *ASME International Mechanical Engineering Congress and Exposition (IMECE) – Applications of Computational Heat Transfer*, Pittsburgh, PA, November 2018.

Articles

J. Nakao, "The Pot of Gold at the End of the Rainbow – How Mathematics Departments Can Increase LGBTQ+ Inclusivity", *MAA Math Values Blog*, April 2021. (link here)

J. Nakao, "Adventures in Book Collecting", *The Atrium – University of Delaware's Quarterly Newsletter*, September 2019. (link here)

Open Access Handbooks and Reference Guides

J. Nakao, "The Handbook of MATH221". (link here)

J. Nakao, "A Mathematica Reference Guide (for calculus students)". (link here)

J. Nakao, "A Gentle Introduction to LaTeX". (link here)

J. Nakao and D. Hayes, "A MATLAB Reference Guide for Undergraduate STEM Majors". (link here)

PRESENTATIONS

- "A new Eulerian-Lagrangian Finite Volume (ELFV) Method for Solving Convection-Diffusion Equations and Hyperbolic Conservation Laws" March 2022
  AMS Spring Central Sectional Meeting (virtual), originally hosted by Purdue University, West Lafayette, IN
- "A new Eulerian-Lagrangian Finite Volume (ELFV) Method for Solving Convection-Diffusion Equations and Hyperbolic Conservation Laws" December 2021
  Hallenbeck Graduate Student Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE
- "An Eulerian-Lagrangian Finite Volume Method for Solving Nonlinear Transport Equations" July 2021
  SIAM Annual Meeting (virtual), originally at Spokane, WA
- "An Eulerian-Lagrangian Finite Volume (ELFV) Method for Nonlinear Conservation Laws" April 2021
  Hallenbeck Graduate Student Seminar, Department of Mathematical Sciences, University of Delaware, Newark, DE
- "Solving for Exact Stationary Solutions to Shallow-Water Waves" November 2017
  Analysis Seminar, Department of Mathematics, Washington State University, Pullman, WA
- "Modifying an Optimal Payload Sensor Model to Detect Mobile Targets" August 2017
  Summer Scholar Presentations, Air Force Research Laboratory, Albuquerque, NM

POSTERS

- "An Eulerian-Lagrangian Runge-Kutta finite volume (ELRK-FV) method for solving convection-diffusion equations" February 2022
  Winter Research Symposium, University of Delaware, Newark, DE
- "Modifying an Optimal Payload Sensor Model to Detect Mobile Targets" August 2017
  Summer Scholar Poster Session, Air Force Research Laboratory, Albuquerque, NM
- "Reconstructing the water-wave profile from pressure measurements in a moving body of water" April 2017
  AMS Sectional Meeting, Washington State University, Pullman, WA

Research Projects

University of Delaware
Newark, DE

Department of Mathematical Sciences
June 2019–Current

Advisor: Jingmei Qiu

Project 2: Developing an equilibrium-preserving, entropy-dissipative, and mass-, momentum-, energy-preserving low rank tensor method for the Fokker-Planck equation (in collaboration with William Taitano of the Air Force Research Laboratory).

Project 1: Developing an Eulerian-Lagrangian finite volume method for convection and convection-diffusion equations.

Research Topics: Numerical tensors and tensor decompositions, Eulerian-Lagrangian and semi-Lagrangian methods, weighted essentially non-oscillatory (WENO) methods, computational fluid dynamics, computational plasma physics, Fokker-Planck equation

Air Force Research Laboratory — Edwards, CA

Aerospace Systems Directorate — *(upcoming) May 2022–August 2022*

Mentors: William Taitano and Alexander Alekseenko

Project: Building low rank tensor algorithms for solving the Fokker-Planck equation

Air Force Research Laboratory — Edwards, CA

Aerospace Systems Directorate — *May 2021–August 2021*

Mentors: Robert Martin and Alexander Alekseenko

Project: Modelling the Fokker-Planck and Vlasov-Fokker-Planck equations

Seattle University — Seattle, WA

Department of Mechanical Engineering — *March 2017–July 2018*

Advisor: Yen-Lin Han

Project: Building mathematical models for the heat transfer in thermal cancer ablation probes

Research Topics: heat conduction in solids, cancer ablation probes, Fourier transforms

Seattle University — Seattle, WA

Mathematics Department — *September 2015–December 2017*

Advisor: Katie Oliveras

Project: Euler's equations of motion, solving for nonlocal relationships between bathymetry and shallow-water wave height

Research Topics: water waves, the method of Fokas

Air Force Research Laboratory — Albuquerque, NM

Space Vehicles Directorate — *June 2017–August 2017*

Mentor: Reed Weber

Interim security clearance (secret)

Project: Modifying and implementing an optimal payload sensor model

Teaching

University of Delaware

- **Courses Taught**
  - *MATH 243 (calculus 3 for physical sciences and engineering with lab component)* — Winter 2022
  - *MATH 221 (calculus 1 for life sciences and business)* — Winter 2021
  - *MATH 221 (calculus 1 for life sciences and business)* — Winter 2020
- **Teaching Assistantships**
  - *MATH 243 (calculus 3 for physical sciences and engineering with lab component)* — Fall 2021
  - *MATH 243 (calculus 3 for physical sciences and engineering with lab component)* — Fall 2020
  - *MATH 221 (calculus 1 for life sciences and business)* — Spring 2020
  - *MATH 221 (calculus 1 for life sciences and business)* — Fall 2019
  - *MATH 241 (calculus 1 for physical sciences and engineering)* — Spring 2019
  - *MATH 221 (calculus 1 for life sciences and business)* — Fall 2018

- **Other Instruction**

  Graduate qualifying exam review for techniques of applied mathematics Summer 2021

  Graduate qualifying exam review for techniques of applied mathematics Winter 2021

Seattle University

- **Teaching Assistantships**

  MATH 2330 (multivariable calculus for physical sciences and engineering) Spring 2018

  MATH 2340 (ordinary differential equations) Winter 2018

  MATH 2340 (ordinary differential equations) Fall 2017

  MATH 2330 (multivariable calculus for physical sciences and engineering) Spring 2017

  MATH 2340 (ordinary differential equations) Winter 2017

  MATH 2330 (multivariable calculus for physical sciences and engineering) Fall 2016

Service and Extracurricular

Diversity In The Broader Mathematics Community

- Spectra Board of Directors July 2021–Current

  Spectra (website link here) is the association for LGBTQ+ mathematicians.

  Membership Committee Chair

  Responsibilities: organizing social events, overseeing visibility campaigns, and taking actions to promote membership.
  Contributions: managing the Out and Ally Lists on Spectra's website, co-organizing the 2022 Joint Mathematics Meetings reception, and co-organizing the American Mathematical Society (AMS)-sponsored diversity posters highlighting LGBTQ+ mathematicians.

University of Delaware

- Mathematics Department Graduate Committee Member September 2021–Current

  Responsibilities: communicating between the graduate students and faculty, ensuring every decision is inclusive of all graduate students, promoting the department to prospective students, and ensuring the voices and interests of the graduate student body were heard and accounted for at graduate committee meetings.
  Contributions: organizing prospective student meet and greets with current graduate students, organizing the annual department picnic, helping draft a new qualifying exam system.

- Queer and Trans Graduate Student Union (QTGSU) June 2021–Current

  Executive Board Member, Accessibility Committee

  Responsibilities: ensuring accessibility of all activities, assisting the treasurer, organizing community events, and upholding the values of the organization.
  Contributions: co-drafted the bylaws and organizational structure, was one of ten graduate students that helped form QTGSU, created access guides and documents.

- Society for Industrial and Applied Mathematics (SIAM) Student Chapter July 2019–June 2021

  Treasurer

  Responsibilities: managing the student chapter finances, funding requests, and the end-of-year final report. Also helped coordinate general meetings and social events.

- Association for Women in Mathematics (AWM) Student Chapter September 2020–June 2021

  Professional Development Chair

  Responsibilities: organizing and coordinating professional development workshops, and helping form open discussion on articles about women in STEM.

- Graduate Student Mentor-Mentee Program September 2020–Current

  Mentored two first-year graduate students.
  Responsibilities: monthly check-ins, and offering advice on coursework, balancing life and graduate school, and qualifying exams.

- UD SIAM Seminar Series September 2020–June 2021
  Instigated and organized the UD SIAM Seminar Series inviting PhD students and post-docs from other universities to present their research.

Other

- Memberships Current
  Society for Industrial and Applied Mathematicians (SIAM), Association for Women in Mathematics (AWM), American Mathematical Society (AMS)
- Incoming Student Handbook May 2018
  Instigated and created a student handbook for the Seattle University Mathematics Department's future incoming students. The intention was to give a student point-of-view of life at Seattle University as a mathematics major.

Panels, Workshops, and Minisymposia

Panels

- Panelist at the Virtual Joint Mathematics Meetings April 2022
  Spectra Workshop: Identifying Best Practices Fostering Inclusion and Retention of LGBTQ Mathematicians. Topics of discussion: supporting transgender mathematicians in the work place (Keri Sather-Wagstaff), LGBTQ+ mathematicians balancing work choices with family (Ron Buckmire), best practices for recruitment of LGBTQ+ faculty (Amanda Folsom), and supporting LGBTQ+ graduate students (Joseph Nakao).
- Panelist at Society for Industrial and Applied Mathematics (SIAM) Annual Meeting July 2021
  Minisymposium: Presentations by LGBTQ Mathematicians. Responsible for leading discussion about LGBTQ inclusivity in the applied mathematics community, as well as Spectra's current projects.
- People of Color Caucus October 2017
  Invited by Dr. Rose Ernst of the Political Science Department at Seattle University to facilitate a people of color caucus. Topics of discussion included: racism in academia, and living as a person of color in college.

Workshops and Minisymposia Organized

- SIAM AN22: LGBT Minisymposia July 2022 (upcoming)
  Co-organized two Spectra-sponsored minisymposia highlighting the research of LGBT applied mathematicians.
- Mathematica Workshop March 2021
  Led a Mathematica workshop tailored for undergraduate students in the calculus sequence. Organized by the UD AWM Student Chapter.
- LaTeX Workshop October 2020
  Led an introductory LaTeXworkshop geared towards graduate students in both the mathematics and other departments. Organized by the UD AWM Student Chapter.

Computer Skills

Proficient: MATLAB, Mathematica, LaTeX, Word, Excel, Powerpoint
Some experience: Fortran 90, Python, Julia