Victoria Kala

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EDUCATION

University of California, Los Angeles — Los Angeles, CA
Ph.D. Mathematics — Expected: Jun 2024
Advisor: Joseph Teran

University of California, Santa Barbara — Santa Barbara, CA
M.A. Applied Mathematics — Jun 2017

Utah Valley University — Orem, UT
B.S. Mathematics, *cum laude* — May 2014
B.S. Physics, *cum laude*

RESEARCH INTERESTS

Computational and applied mathematics, physics-based simulations, computer graphics, material point methods (MPM), fluids, continuum mechanics, numerical partial differential equations

PUBLICATIONS

1. Kaneda, Ayano, Osman Akar, Jingyu Chen, **Victoria Kala**, David Hyde, and Joseph Teran. "A Deep Conjugate Direction Method for Iteratively Solving Linear Systems." In International Conference on Machine Learning, pp. 15720-15736. PMLR, 2023.

2. Chen, Jingyu, **Victoria Kala**, Alan Marquez-Razon, Elias Gueidon, David A.B. Hyde, and Joseph Teran. "A momentum-conserving implicit material point method for surface tension with contact angles and spatial gradients." ACM Transactions on Graphics (TOG) 40, no. 4 (2021): 1-16.

3. **Kala, Victoria**, Katherine Guo, Elizabeth Swantek, Alan Tong, Monique Chyba, Yuriy Mileyko, Chris Gray, Thomas Lee, and Alice Koniges. "Pandemics in Hawai'i: 1918 Influenza and COVID-19." IARIA, 2020, 26-31.

4. Hollifield, Elliott, **Victoria Treviño**, and Adam Zarn. "A Survival Analysis of the Duration of Olympic Records." arXiv preprint arXiv:1207.6133 (2012).

5. French, Brigham S., Joseph B. Jensen, John P. Blakeslee, Nathan Boyer, and **Victoria Treviño**. "Calibrating the IR Surface Brightness Fluctuation Distance Scale Using HST WFC3." AAS 220 (2012): 332-02.

SELECTED AWARDS AND HONORS

- Balbes Award for top performing female graduate student, UCLA, 2022
- Eugene V. Cota-Robles Fellowship, UCLA, 2020−2021, 2017−2018
- Graduate Student Research Fellowship, UCLA, 2020
- Excellence in Teaching Award, UCSB, 2016
- Tutor of the Year, UVU, 2012
- Astrophysics Research Scholarship, UVU, 2012
- Exemplary Merit Scholarship, UVU, 2009−2014

RESEARCH EXPERIENCE

University of California, Los Angeles — Los Angeles, CA
Graduate Student Research — Apr 2019 − Present

I collaborate with my advisor, graduate students, and researchers to develop and manage a codebase for physics-based simulations for multiple materials involving material point methods (MPM), finite element methods, hybrid Lagrangian material point methods, and incompressible fluid simulation using continuum mechanics, numerical analysis, and multithreading. My research projects have included thermomechanical material point methods and incompressible flulid simulation for simulation of burning solids, melting solids, and coupling between incompressible fluids and MPM solids.

University of Michigan, Ann Arbor — Ann Arbor, MI
Institut d'Optique Graduate School — Palaiseau, France
Optics in the City of Light International REU — Jun 2013 − Aug 2013
Simulation and Optimization of Multilayer Mirrors

I performed simulation and optimization of period and aperiodic multilayer mirrors using MATLAB and IMD. I also assisted with multilayer mirror deposition in a clean room.

California State University, Fresno — Fresno, CA
CSU Fresno Mathematics REU — Jun 2012 − Jul 2012
A Survival Analysis of the Duration of Olympic Records

I performed statistical analysis on Olympic data to determine the duration of Olympic records. My research group also made predictions on which Olympic records were at risk of being broken for the 2012 Olympics. Programming languages SAS and R were used to perform the analysis and predictions.

Utah Valley University — Orem, UT
Astrophysics Research Project — May 2012 − Jun 2012
Calibrating the IR Surface Brightness Fluctuation Distance Scale Using HST WFC3

I performed image processing techniques and data analysis on several galaxy images taken by Hubble Telescope WFC3/IR. These techniques were used to calculate surface brightness fluctuation magnitudes and determine distances to galaxies.

PROFESSIONAL EXPERIENCE

Weta FX (Formerly Weta Digital) — Los Angeles, CA
Simulation Intern — Jun 2021 − Nov 2021

I collaborated with researchers at Weta Digital to develop a method for simulating burning of solid materials, as well as coupling between incompressible fluids and MPM solids.

SELECTED TEACHING EXPERIENCE

University of California, Los Angeles — Los Angeles, CA
Teaching Assistant Consultant (TAC) — Sep 2023 − Present

I co-led the mathematics department pedagogy and training seminar for new teaching assistants. Additionally, I supported new teaching assistants through consultation, observations, and feedback. I further developed insight into learning communities, equitable and inclusive teaching, backward design, universal design for learning, and active and collaborative learning through the TAC Academy.

Graduate Student Instructor (Instructor of Record) Jan 2022 − Sep 2023

Lower division: Calculus of Several Variables.
Upper division: Applied Numerical Methods.
Average teaching rating over 3 courses: 9.54/10

Graduate Teaching Assistant Jun 2018 − Jun 2023

Lower division: Precalculus, Differential and Integral Calculus, Integration and Infinite Series, Calculus of Several Variables, Linear Algebra, Differential Equations.
Upper division: Applied Numerical Methods.
Average teaching rating over 22 courses: 9.43/10

University of California, Santa Barbara Santa Barbara, CA
Graduate Teaching Assistant Sep 2014 − Jul 2017

I received the Graduate Student Association's campus-wide Excellence in Teaching Award for the 2015−2016 school year.
Lower division: Calculus, Linear Algebra, Differential Equations, Vector Calculus.
Upper division: Introduction to Numerical Analysis, Methods of Analysis.

SKILLS

- **Mathematics:** solid background in computational and applied mathematics, including numerical analysis, numerical linear algebra, numerical differential equations, ordinary and partial differential equations, optimization
- **Programming:** C++, Python, MATLAB, Mathematica, Maple, LaTeX, Houdini, Git, CMake, vim, Eigen, TBB, GDB, Valgrind
- **Operating Systems:** Mac OS X, Windows, Linux

SELECTED PRESENTATIONS

- International Conference on Machine Learning, "A Deep Conjugate Direction Method for Iteratively Solving Linear Systems", Honolulu, HI, July 2023
- SIGGRAPH, "A Momentum-Conserving Implicit Material Point Method for Surface Tension with Contact Angles and Spatial Gradients.", Los Angeles, CA, August 2021
- École Polytechnique, "Simulation and Optimization of Multilayer Mirrors," Palaiseau, France, July 2013
- Joint Mathematics Meeting, "A Survival Analysis of the Duration of Olympic Records," San Diego, CA, January 2013

PROGRAM PARTICIPATION

University of Nebraska, Lincoln Lincoln, NE
Nebraska IMMERSE Jun 2014 − Jul 2014

IMMERSE (Intensive Mathematics: a Mentoring, Education and Research Summer Experience) is a preparation program for students who are about to enter their first year of graduate study in mathematics.

Institute of Advanced Study Princeton, NJ
IAS Women and Mathematics Program May 2014
Topic: Random Matrix Theory

The Women and Mathematics program is an annual program with a mission to recruit and retain more women in mathematics.

SERVICE AND OUTREACH

University of California, Los Angeles Los Angeles, CA
Women in Mathematics Sep 2017 − present

University of California, Santa Barbara Santa Barbara, CA
Graduate Student Association Excellence in Teaching Award Committee Apr 2017

Utah Valley University Orem, UT
Math Girls Rock! Aug 2011 − May 2012