

Stephanie Wang

About

My research interests are in geometry processing and physics simulations. I love exploring mathematical solutions that improve existing algorithms and pipelines in computer graphics.

Geometric optimization: Many geometry processing tasks boil down to optimization problems, many of which are nonconvex. New mathematical insights can help discover the convex equivalent problems which comply with the fast and robust convex solvers.

Physics modeling: Physical phenomena like solids, fluids, friction, fracture are crucial in building a virtual world. Existing algorithms often have to choose between performance and accuracy. Mathematical theories can inspire novel discretization schemes that are both faster and better at conserving important physical quantities.

Education

Ph.D. and M.S. in Mathematics, UCLA, Eugene V. Cota-Robles Fellow. **2014-2020**
Committee: [Jeffrey D. Eldredge](#), [Wotao Yin](#), [Luminita Aura Vese](#), and [Joseph M. Teran](#) (advisor)

B.S. in Mathematics, National Taiwan University, *magna cum laude*. **2009-2013**

Experience

Research

Postdoc – with Prof. [Albert Chern](#), UCSD, San Diego, CA. **2020-present**

Geometry processing and physical simulation using mathematical insights from geometric measure theory, exterior calculus, partial differential equations, and optimization theory. Developing in Houdini and Python. Mentored students: [Mohammad Sina Nabizadeh](#), [Shiyang Jia](#), [Chad McKell](#), [Hang Yin](#), [Baichuan Wu](#).

(Note: I took a full-time medical leave between Feb-Aug 2022 to recover from an acute illness.)

Ph.D. Study – with Prof. [Wilfrid Gangbo](#), UCLA, Los Angeles, CA. **2019-2020**

Regularity theory for minimizers of polyconvex functionals related to Navier-Stokes equation.

Exchange Study – with Prof. [Johan Gaume](#), EPFL, Lausanne, Switzerland. **2019 summer**

Simulations and data analysis of snow and tire interaction, avalanche release, and snow micro-structure.

Ph.D Study – with Prof. [Joseph Teran](#), UCLA, Los Angeles, CA. **2016-2019**

Physics-based simulations of various materials with Material Point Method and Finite Element Method, using continuum mechanics, convex and nonconvex optimization technique, numerical analysis, parallel computing, developing in C++ and Houdini.

Research Assistant – with Prof. [Wen-Wei Lin](#), NCTU, Hsinchu, Taiwan. **2013-2014**

Generalized eigenvalue problems using MATLAB programming.

Industry

Tech Intern, Walt Disney Animation Studio, Burbank, CA. **2018 summer**

R&D for pioneering simulation technology in animated feature films, teaming with VFX artists and developing in C++ and HDK.

Teaching

Assistant Adjunct Professor, UCLA Math Dept, Los Angeles, CA (virtual). **2020**

Taught remote classes for upper and lower division undergraduate courses: Machine Learning (Math156) and Calculus of Several Variables (Math32A).

Graduate Student Instructor, UCLA Math Dept, Los Angeles, CA. **2019 spring**

Taught course: Linear Algebra and Applications (Math33A).

Teaching Assistant, UCLA Math Dept, Los Angeles, CA. **2015-2020**

Led discussion sessions and graded homework/exams for 11 undergraduate and graduate level courses: linear algebra and introduction to mathematical proofs (Math 115A), undergrad- and grad-level numerical methods (Math 151B, 269A), introductory, intermediate, and advanced C++ programming (PIC 10A, 10B, 10C).

Awards

Rising Stars in Computer Graphics Research , <i>WiGRAPH</i> .	May 2022
Best Paper Award , <i>ACM SIGGRAPH/Eurographics Symposium on Computer Animation</i> .	Jul 2019
Eugene V. Cota-Robles Fellowship , <i>UCLA</i> .	Sep 2014
Dean's Award , <i>College of Science, National Taiwan University</i> .	Jun 2013
Bronze Medal in Applied and Computational Mathematics , <i>S.T. Yau College Student Mathematics Contest</i> .	Aug 2012

Preprint

Wave Simulations in Infinite Spacetime

Chad McKell, Mohammad Sina Nabizadeh, [Stephanie Wang](#), Albert Chern

Fluid Cohomology

Hang Yin, Mohammad Sina Nabizadeh, Baichuan Wu, [Stephanie Wang](#), Albert Chern

(accepted for publication in ACM Transactions on Graphics and presentation at SIGGRAPH 2023)

Publications

Covector Fluids

Mohammad Sina Nabizadeh, [Stephanie Wang](#), Ravi Ramamoorthi, Albert Chern

ACM Transactions on Graphics (SIGGRAPH 2022)

DeepCurrents: Learning Implicit Representations of Shapes with Boundaries

David Palmer, Dmitriy Smirnov, [Stephanie Wang](#), Albert Chern, Justin Solomon

Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR 2022)

Role Detection in Bicycle-Sharing Networks Using Multilayer Stochastic Block Models

Jane Carlen, Jaume de Dios Pont, Cassidy Mentus, Shyr-Shea Chang, [Stephanie Wang](#), Mason A. Porter

Network Science, 2022

Computing minimal surfaces with differential forms

[Stephanie Wang](#) and Albert Chern

ACM Transactions on Graphics (SIGGRAPH 2021)

Computational micromechanics of porous brittle solids

Lars Blatny, Henning Löwe, [Stephanie Wang](#), Johan Gaume

Computers and Geotechnics, 2021

A Material Point Method for Elastoplasticity with Ductile Fracture and Frictional Contact

[Stephanie Wang](#)

UCLA Doctoral Dissertation, 2020

A thermomechanical material point method for baking and cooking

Mengyuan Ding, Xuchen Han, [Stephanie Wang](#), Theodore F. Gast, Joseph M. Teran

ACM Transactions on Graphics (SIGGRAPH Asia 2019)

A Hybrid Material Point Method for Frictional Contact with Diverse Materials

Xuchen Han, Theodore F. Gast, Qi Guo, [Stephanie Wang](#), Chenfanfeng Jiang, Joseph M. Teran

Proceedings of the ACM on Computer Graphics and Interactive Techniques (SCA 2019)

Simulation and Visualization of Ductile Fracture with the Material Point Method

[Stephanie Wang](#), Mengyuan Ding, Theodore F. Gast, Leyi Zhu, Steven Gagniere, Chenfanfeng Jiang, Joseph M. Teran

Proceedings of the ACM on Computer Graphics and Interactive Techniques (SCA 2019 Best Paper)

Invited talks

Conferences / Workshops

Geometry Workshop in Obergurgl, Obergurgl, Austria.

Sep 2021

SIGGRAPH, (virtual).

Aug 2021

SCA, Los Angeles, CA.

Aug 2019

Colloquia / Seminars

NCSU, Raleigh, NC (virtual).

Feb 2022

MIT, Cambridge, MA.

Nov 2021

Autodesk , (virtual).	Nov 2021
Online Seminar Geometric Analysis , (virtual).	Nov 2021
Toronto Geometry Colloquium , Toronto, ON (virtual).	Oct 2021
UCSD (CSE Vis-Comp) , San Diego, CA (virtual).	Apr 2021
UCSD (CCoM) , San Diego, CA (virtual).	Jan 2021
CMU , Pittsburgh, PA (virtual).	Dec 2020
GAMES Webinar , (virtual).	May 2020
College of the Holy Cross , Worcester, MA (virtual).	Nov 2019
Inria Grenoble-Rhône-Alpes , Grenoble, France.	Sep 2019
ETH Zürich , Zürich, Switzerland.	Aug 2019

Graduate Student Seminars

EPFL , Lausanne, Switzerland.	Aug 2019
UCLA , Los Angeles, CA.	Nov 2018

Services

Committee member , <i>Eurographics</i> . Served as committee member for the Eurographics 2023 short papers program.	2022-present
Reviewer , <i>SIGGRAPH</i> , <i>SIGGRAPH Asia</i> , <i>Eurographics</i> . Reviewed technical papers in areas including geometry processing, physical simulation, and scientific computing.	2021-present
Research project mentor , <i>Summer Geometry Institute</i> . Designed a research project and advised undergraduate fellows on minimal surfaces using both Lagrangian and Eulerian representations.	2021
Math Dept Representative , <i>Graduate Student Association, UCLA</i> . Advocated for student rights in campus-level organizations and organized cross-department social events.	2017-2020
Volunteer , <i>AWiSE STEM Day, Explore Your Universe</i> . Presented interactive math booth in annual science fair designated for middle school girls and general public.	2015-2020
Chief Organizer , <i>Women in Math, UCLA</i> . Organized social and volunteering events, represented and advocated for women in math dept.	2016-2018
Creator , <i>Women in Math Mentorship Program, UCLA</i> . Negotiated for fundings and created the program that hosts regular mixers for undergraduate and graduate fellows to increase connection, awareness, and mentorship.	2017
Fellow Mentor , <i>California Teach, UCLA</i> . Mentored and advised Math and Statistics undergraduate students from underrepresented demographics.	2016-2018
Vice President , <i>Lambda Club, National Taiwan University</i> . Organized academic and social events and grew the community from 3 people to 30+ during my service.	2012-2013

Skills

Programming: C++ (Eigen, tbb), Python (PyTorch, SciPy), lua, MATLAB (CVX), \LaTeX , zsh
Tools: Houdini, Vim, git, gdb, valgrind
Math: Optimization, differential geometry, numerical and theoretical PDEs, scientific computing
Languages: English and Mandarin Chinese - bilingual proficiency
Hobbies: Rock climbing, hiking, cooking

Last updated: May 23, 2023.