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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 undergratuate 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, *WiGRAPH*. **May 2022**

Best Paper Award, *ACM SIGGRAPH/Eurographics Symposium on Computer Animation*. **Jul 2019**

Eugene V. Cota-Robles Fellowship, *UCLA*. **Sep 2014**

Dean's Award, College of Science, *National Taiwan University*. **Jun 2013**

Bronze Medal in Applied and Computational Mathematics, *S.T. Yau College Student Mathematics Contest*. **Aug 2012**

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, Chenfanfi 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, Chenfanfu 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, *Eurographics*. **2022-present**
Served as committee member for the Eurographics 2023 short papers program.

External reviewer, *SIGGRAPH, SIGGRAPH Asia, Eurographics*. **2021-present**
Reviewed technical papers in areas including geometry processing, physical simulation, and scientific computing.

Research project mentor, *Summer Geometry Institute*. **2021**
Designed a research project and advised undergraduate fellows on minimal surfaces using both Lagrangian and Eulerian representations.

Math Dept Representative, *Graduate Student Association, UCLA*. **2017-2020**
Advocated for student rights in campus-level organizations and organized cross-department social events.

Volunteer, *AWiSE STEM Day, Explore Your Universe*. **2015-2020**
Presented interactive math booth in annual science fair designated for middle school girls and general public.

Chief Organizer, *Women in Math, UCLA*. **2016-2018**
Organized social and volunteering events, represented and advocated for women in math dept.

Creator, *Women in Math Mentorship Program, UCLA*. **2017**
Negotiated for fundings and created the program that hosts regular mixers for undergraduate and graduate fellows to increase connection, awareness, and mentorship.

Fellow Mentor, *California Teach, UCLA*. **2016-2018**
Mentored and advised Math and Statistics undergraduate students from underrepresented demographics.

Vice President, *Lambda Club, National Taiwan University*. **2012-2013**
Organized academic and social events and grew the community from 3 people to 30+ during my service.

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: April 7, 2023.