Oded Stein
Curriculum Vitae

941 Bloom Walk
Los Angeles, CA
90089

ostein@usc.edu
odedstein.com

Research Interests	geometric signal processing, machine learning, discrete geometry,, differential geometry, numerical analysis of partial differential equations, computer graphics, physical simulation

Research Positions

Assistant Professor, University of Southern California, CA, USA　　**2023-Now**
- Developing neural networks for computer animation
- Low-information geometry processing
- Researching sparse smoothing energies
- Reconfigurable shapes

Postdoctoral Fellow, MIT, Cambridge MA, USA　　**2020-2022**
Advisor: Justin Solomon
- Researched the mathematical properties of distortion energies and parametrization methods, developing convergent ADMM methods for distortion optimization
- Introduced methods for the segmentation and fabrication of discrete piecewise developable surfaces
- Discretized frame field operators using octahedral energies
- Solved geometric puzzles

PhD Student, Columbia University, New York NY, USA　　**2015-2020**
Advisor: Eitan Grinspun
- Developed smoothing energies without boundary bias on flat and curved surfaces
- Introduced a novel definition of discrete developability for triangle meshes, together with a flow to approximate surfaces by piecewise developable surfaces amenable for fabrication
- Proved the convergence of numerical methods on curved surfaces, specifically the mixed finite element method for the biharmonic equation
- Worked on geometric fabrication methods
- Investigated differential operators on surfaces

Research Intern, Pixar Animation Studios, Emeryville CA, USA　　**2017**
Supervisors: Fernando de Goes, Mark Meyer
- Developed a method for fitting elaborate character articulations to simple primitives

BSc/MSc Student, ETH Zürich, Switzerland　　**2010-2015**
Advisor: Ralf Hiptmair
- Formulated a Boundary Element Method for a Maxwell-type equation on the sphere
- Derived a Boundary Element Method for a Maxwell-type equation in R3 for surfaces with difficult boundary topology

Degrees

PhD in Applied Mathematics, Columbia University, New York NY, USA　　**2020**
MSc in Mathematics (with distinction), ETH Zürich, Switzerland　　**2015**
BSc in Mathematics, ETH Zürich, Switzerland　　**2013**

Awards & Scholarships	**SIAM Activity Group on Geometric Design Early Career Prize**	**2025**
	Awarded at the SIAM General Meeting 2025 in Montreal	

SGP Software Award **2025**
for Gpytoolbox, a geometry processing library, *together with Silvia Sellán*

Powell Faculty Research Award **2023**
USC internal faculty award

SNSF Early Postdoc.Mobility Fellowship **2020-2022**
Swiss research fellowship funding my postdoctoral research

Virtual Heidelberg Laureate Forum **2020**
Participant

ETH Excellence Scholarship and Opportunity Programme **2013-2015**
ETH student fellowship funding my masters studies

Member of the Swiss Study Foundation **2010-2019**
Swiss honor society for excellent university students

Publications

Sharpening and Sparsifying with Surface Hessians **2024**
Dylan Rowe, Alec Jacobson, Oded Stein
ACM SIGGRAPH Asia 2024 Conference Proceedings

***Reach For the Arcs*: Reconstructing Surfaces from SDFs via Tangent Points** **2024**
Silvia Sellán, Yingying Ren, Christopher Batty, Oded Stein
ACM SIGGRAPH 2024 Conference Proceedings

Neural Monte Carlo Fluid Simulation **2024**
Pranav Jain, Ziyin Qu, Peter Yichen Chen, Oded Stein
ACM SIGGRAPH 2024 Conference Proceedings

A Framework for Solving Parabolic Partial Differential Equations on Discrete Domains
Leticia Mattos Da Silva, Oded Stein, Justin Solomon **2024**
ACM Transactions on Graphics, Vol. 43, No. 5, 2024

***Reach For the Spheres*: Tangency-Aware Surface Reconstruction of SDFs** **2023**
Silvia Sellán, Christopher Batty, Oded Stein
ACM SIGGRAPH Asia 2023 Conference Proceedings

Variational Barycentric Coordinates **2023**
Ana Dodik, Oded Stein, Vincent Sitzmann, Justin Solomon
ACM Transactions on Graphics, Vol. 42, No. 6, 2023

An Adaptive Fast-Multipole-Accelerated Hybrid Boundary Integral Equation Method for Accurate Diffusion Curves   **2023**
Seungbae Bang, Kirill Serkh, Oded Stein, Alec Jacobson
ACM Transactions on Graphics, Vol. 42, No. 6, 2023

Symmetric Volume Maps: Order-Invariant Volumetric Mesh Correspondence with Free Boundary   **2023**
S. Mazdak Abulnaga, Oded Stein, Polina Golland, Justin Solomon
ACM Transactions on Graphics, Vol. 42, No. 3, 2023

A Splitting Scheme for Flip-Free Distortion Energies   **2022**
Oded Stein, Jiajin Li, Justin Solomon
SIAM Journal on Imaging Sciences, Vol. 15, Iss. 2, 2022

Frame Field Operators   **2021**
David Palmer, Oded Stein, Justin Solomon
Computer Graphics Forum, Vol. 40, No. 5, 2021

Smoothness Energies in Geometry Processing   **2020**
Oded Stein
PhD Thesis, Columbia University, 2020

A Simple Discretization of the Vector Dirichlet Energy   **2020**
Oded Stein, Max Wardetzky, Alec Jacobson, Eitan Grinspun
Computer Graphics Forum, Vol. 39, No. 5, 2020

A Smoothness Energy without Boundary Distortion for Curved Surfaces   **2020**
Oded Stein, Alec Jacobson, Max Wardetzky, Eitan Grinspun
ACM Transactions on Graphics, Vol. 39, No. 3, 2020

Interactive Design of Castable Shapes using Two-Piece Rigid Molds   **2019**
Oded Stein, Alec Jacobson, Eitan Grinspun
Computers & Graphics, Vol. 80, p51-62, 2020

Developability of Triangle Meshes   **2018**
Oded Stein, Eitan Grinspun, Keenan Crane
ACM Transactions on Graphics, Vol. 37, No. 4, 2018

Natural Boundary Conditions for Smoothing in Geometry Processing   **2018**
Oded Stein, Eitan Grinspun, Max Wardetzky, Alec Jacobson
ACM Transactions on Graphics, Vol. 37, No. 2, 2018

Grant Funding   **NSF IIS Standard Grant (Award #2335493)**   **2024-2027**
Collaborative Research: HCC: Small: Discretization-Free Geometry Processing

Teaching Experience

Professor, University of Southern California, Los Angeles CA, USA   **2023-Now**
CSCI 420 30230R: Computer Graphics   *2024*
Undergraduate computer science course
CSCI 599 30015D: Geometric Shape Modeling   *2024*
Graduate computer science course
CSCI 699 30049D: Computer Graphics Research – A Roleplaying Seminar   *2023*
Graduate computer science course

Lecturer, Summer Geometry Institute (SGI), Cambridge MA, USA   **2021-2024**
An Introduction to Geometry
Remote class with interactive github exercise introducing geometry processing and computer graphics to bright undergraduate students in a summer school

Lecturer, SGP Graduate School, Cambridge MA, USA   **2024**
Geometry Processing Research in Python
In-person graduate summer school lecture on using Python for geometry processing research

Lecturer, SGP Graduate School, Toronto, Canada   **2021**
An Introduction to Geometry Processing Programming in MATLAB with gptoolbox
Created video lecture & interactive GitHub programming tutorial introducing new students to geometry processing programming in MATLAB

Lecturer, SGP Graduate School, Toronto, Canada   **2021**
A Quick Introduction to the Laplacian and Bilaplacian Through the Theory of Partial Differential Equations
Created video lecture & written lecture notes teaching the mathematical foundations of Partial Differential Equations with Sobolev space theory and finite elements to an applied computer science audience

Substitute Lecturer, Columbia University and the University of Toronto   **2017-2020**
New York NY, USA, and Toronto, Canada
CCSC2521 (UofT): Seminar in Geometry and Animation   *2020*
Taught in-person seminar units, led student discussion, evaluated student work
COMS4995 (Columbia), CSC2520 (UofT): Geometry Processing   *2017, 2018*
Taught in-person lectures introducing the Laplacian and the finite element method as used in geometry processing and computer graphics to undergraduate and graduate students

Teaching Assistant for Various Classes   **2013-2016**
COMS4167: Computer Animation, APMA4001: Principles of Applied Mathematics, APMA4101: Introduction to Dynamical Systems at Columbia University
401-2654-00L: Numerical Analysis II at ETH Zürich
Composed and graded homework, midterms, and final exams; leading recitation sessions; supported students with programming and computer systems

Student Supervision

PhD Student, University of Southern California, USA　　　　　**2024-Now**
Student: Letao (Jenna) Chen
Supervising a PhD student in thesis work

PhD Student, University of Southern California, USA　　　　　**2024-Now**
Student: David (Jae Yoon) Cha
Supervising a PhD student in thesis work

PhD Student, University of Southern California, USA　　　　　**2023-Now**
Student: Dylan Rowe
Supervising a PhD student in thesis work

PhD Student, University of Southern California, USA　　　　　**2023-Now**
Student: Pranav Jain
Supervising a PhD student in thesis work

Undergraduate Research Project, University of Southern California, USA　　**2023-Now**
Student: Alice (Ziyu) Wei
Supervising an undergraduate student in a research project on global parametrization

Undergraduate Research Project, University of Southern California, USA　　**2023**
Student: Terry Tao
Supervising an undergraduate student in research in 3D printing fabrication

Undergraduate Research Opportunities Program, MIT, USA　　　**2021**
Student: Georgia Shay
Supervising an undergraduate research assistant in researching ways for quantifying the quality of surface parametrizations

Undergraduate Research Opportunities Program, MIT, USA　　　**2021**
Student: Holly Jackson
Supervising an undergraduate research assistant in developing a novel method for segmenting piecewise developable surfaces for the purpose of fabrication

Masters Thesis, University of Darmstadt, Germany　　　　　　**2021**
Student: Markus Borkowski
Supervising a masters thesis with the goal of developing a boundary element method for the Helmholtz equation on surfaces

Summer Internship, University of Toronto, Canada　　　　　　**2020**
Student: Jean Jouve
Supervised a summer project developing a performant surface-only fluid simulation method

Student Project, University of Toronto, Canada　　　　　　　**2020**
Students: Jiayi (Eris) Zhang, Peiqi (Mark) Wang, Julia Gilenko
Supervised a class project implementing a performant surface deformation method

Software Projects	**Gpytoolbox: A *Python* Geometry Processing Toolbox**	**2022-Now**

Silvia Sellán, Oded Stein
A general-purpose geometry processing library with pure python functions as well as python bindings to efficient C++ code

Conferences & Invited Talks	**Obergurgl Geometry Workshop, Obergurgl, Austria**	**2023**

A New Old Idea for Surface Reconstruction

UCSD Pixel Cafe, San Diego, USA   **2023**
Optimization for Parametrization and Volume Correspondence

NSF FRG Workshop on Discrete Shapes, Harvard University, Cambridge MA, USA   **2022**
Optimization for flip-free parametrization

16. US National Congress on Computational Mechanics, Chicago IL, USA   **2021**
A Mixed Finite Element Method With Piecewise Linear Elements for the Biharmonic Equation on Surfaces (Minisymposium)

Seminar in Geometric Analysis of the University of Pittsburgh, PA, USA   **2021**
The Biharmonic Equation in Geometry Processing

Toronto Geometry Colloquium, Toronto, Canada   **2020**
We've had Laplacian, yes. What about Bilaplacian?

Strobl Geometry Workshop, Strobl, Austria   **2019**
Boundary Conditions of the Biharmonic Equation on Curved Surfaces

SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland   **2019**
Developability of Triangle Meshes (Minisymposium)

World Congress on Computational Mechanics, New York NY, USA   **2018**
Natural Boundary Conditions for Smoothing in Geometry Processing (Minisymposium)

dgp Seminar, University of Toronto, Canada   **2016**
The finite element method for higher-order PDEs on subdivision surfaces

Söllerhaus Workshop on Fast Boundary Element Methods in Industrial Applications, Austria   **2016**
Maxwell Equations on S2

Academic Community Work	**SIGGRAPH 2025 Technical Papers Committee (TPC)**	**2025**

Organizing reviewing, rebuttals and shepherding for the top computer graphics conference.

Tutorial Week Chair, Summer Geometry Institute (SGI), Cambridge MA, USA   **2024**
Organized the tutorial week of MIT's SGI by planning a curriculum and assembling instructors.

Eurographics International Program Committee (IPC)   **2024-2025**
Organized reviewers and shepherding submissions at a top graphics conference

Symposium on Geometry Processing (SGP) Technical Papers Committee   **2021-2025**
Organized reviewers and shepherding submissions at a top geometry processing conference

Research Mentor, Summer Geometry Institute (SGI), Cambridge MA, USA   **2023-2024**
Supervising researchers new to their field in their first ever geometry / computer graphics research projects.

RCDC@SIGGRAPH Guides team   **2022-2023**
Developing research guides for the community in the form of multiple blog post series

RCDC@SIGGRAPH Undergraduate Mentorship team   **2021-2022**
Developing mentorship programs for undergraduate students in computer graphics

Pacific Graphics (PG 2020) Program Committee   **2020**
Organized reviewers and shepherding submissions at a computer graphics conference

Graphics Interface (GI 2021) Program Committee   **2020**
Primary reviewing at a computer graphics conference

External Reviewer in Mathematics & Computer Science Journals   **2019-Now**
Variety of Journals including ACM Transactions on Graphics, ACM SIGGRAPH and SIGGRAPH Asia, Computer-Aided Design, Computer Aided Geometric Design, Eurographics, Computers & Graphics

| Other Work Experience | **Software Programmer** *Serranetga AG, Zürich, Switzerland* | **2010-2013** |
| | **Programming Intern** *Serranetga AG, Zürich, Switzerland* | **2009-2010** |

| Extracurricular Activities | **Board member of the Association of Mathematics and Physics Students at ETH Zürich** | **2013-2014** |
| | **Co-president of the Council of Student Associations of ETH Zürich** | **2013-2014** |