Albert Chern | Curriculum Vitae

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Assistant Professor in Computer Science and Engineering at UC San Diego

Academic Position

University of California San Diego — **California, US**
Tenure-track Assistant Professor, Computer Science and Engineering — *July 2020 – Current*

Technical University of Berlin — **Berlin, Germany**
Post-doctoral Researcher, Institute of Mathematics — *July 2017 – June 2020*
Supervisor: Ulrich Pinkall.

Education

California Institute of Technology — **California, US**
PhD, Applied and Computational Mathematics — *Sept. 2012 – June 2017*
Supervisor: Peter Schröder.

National Taiwan University — **Taipei, Taiwan**
M.S. Mathematics — *Jan. 2011 – June 2012*
Supervisor: Keh-Ming Shyue.

National Taiwan University — **Taipei, Taiwan**
B.S. Mathematics — *Sept. 2007 – Jan. 2011*

Honors and Awards

- 2023, NSF CAREER Award (Award number 2239062).
- 2018, SAP Young Researcher Grant at the 6th Heidelberg Laureate Forum.
- 2017, Ben P.C. Chou Doctoral Prize in IST *for outstanding dissertations in the broad area of information science and technology.*
- 2017, W. P. Carey & Co. Prize *for outstanding doctoral dissertations in applied mathematics*.
- 2017, Microsoft Graduate Teaching in CMS Prize *awarded to a graduate student for outstanding teaching and course development in computing and mathematical sciences*.
- 2012, California Institute of Technology CMS Graduate Fellowship.
- 2011, Dean's Award of College of Science, National Taiwan University.

Publications

- Nicolas Nebel and Albert Chern (2023). *Adaptive Surface Meshes from Harmonic Maps*. arXiv:2306.10115 [cs.CG].

- Chad Mckell, Mohammad Sina Nabizadeh, Stephanie Wang and Albert Chern (2023). *Wave Simulations in Infinite Spacetime*. arXiv:2305.08033 [math.NA].
- Hang Yin, Mohammad Sina Nabizadeh, Baichuan Wu, Stephanie Wang and Albert Chern (2023). *Fluid Cohomology*. ACM Transactions on Graphics, Vol. 42(4).
- Albert Chern and Sadashige Ishida (2023). *Area Formula for Spherical Polygons via Prequantization*. arXiv:2303.14555 [math.DG].
- Pengwen Chen, Chung-Kuan Cheng, Albert Chern, Chester Holtz, Aoxi Li and Yucheng Wang (2023). *Placement Initialization via Sequential Subspace Optimization with Sphere Constraints*. Proceedings of the 2023 International Symposium on Physical Design.
- Pengwen Chen, Chung-Kuan Cheng, Albert Chern, Chester Holtz, Aoxi Li and Yucheng Wang (2022). *Late Breaking Results: Placement Initialization via a Projected Eigenvector Algorithm*. Proceedings of the 59th ACM/IEEE Design Automation Conference.
- Zhuoyuan Wang, Haoming Jing, Christian Kurniawan, Albert Chern and Yorie Nakahira (2022). *Myopically verifiable probabilistic certificate for long-term safety*. American Control Conference (ACC).
- Sadashige Ishida, Chris Wojtan and Albert Chern (2022). *Hidden Degrees of Freedom in Implicit Vortex Filaments*. ACM Transactions on Graphics, Vol. 41(6), Art. 113.
- Mohammad Sina Nabizadeh, Stephanie Wang, Ravi Ramamoorthi and Albert Chern (2022). *Covector Fluids*. ACM Transactions on Graphics, Vol. 41, No. 4, Art. 113.
- Marcel Padilla, Oliver Gross, Felix Knöppel, Albert Chern, Ulrich Pinkall and Peter Schröder (2022). *Filament Based Plasma*. ACM Transactions on Graphics, Vol. 41(4), Art. 153.
- David Palmer, Dmitriy Smirnov, Stephanie Wang, Albert Chern and Justin Solomon (2022). *Deep Currents: Learning Implicit Representations of Shapes with Boundaries*. Proceedings of the IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), pp. 18665–18675.
- Albert Chern, Xiang Wang, Abhiram Iyer and Yorie Nakahira (2021). *Safe control in the presence of stochastic uncertainties*. 60th IEEE Conference on Decision and Control (CDC).
- Mohammad Sina Nabizadeh, Ravi Ramamoorthi and Albert Chern (2021). *Kelvin Transformations for Simulations on Infinite Domains*. ACM Transactions on Graphics, Vol. 40(4), Art. 97.
- Stephanie Wang and Albert Chern (2021). *Computing Minimal Surfaces with Differential Forms*. ACM Transactions on Graphics, Vol. 40(4), Art. 113.
- Yousuf Soliman, Albert Chern, Olga Diamanti, Felix Knöppel, Ulrich Pinkall and Peter Schröder (2021). *Constrained Willmore Surfaces*. ACM Transactions on Graphics, Vol. 40(4), Art. 112.
- Andrew O. Sageman-Furnas, Albert Chern, Mirela Ben-Chen and Amir Vaxman (2019). *Chebyshev Nets from Commuting PolyVector Fields*. ACM Transactions on Graphics, Vol. 38(6), Art. 172.
- Marcel Padilla, Albert Chern, Felix Knöppel, Ulrich Pinkall and Peter Schröder (2019). *On Bubble Rings and Ink Chandeliers*. ACM Transactions on Graphics, Vol. 38(4), Art. 129.
- Albert Chern, Felix Knöppel, Franz Pedit, Ulrich Pinkall and Peter Schröder (2019). *Finding Conformal and Isometric Immersions of Surfaces*. arXiv:1901.09432 [math.DG].
- Xi Wang, Albert Chern and Marc Alexa (2019). *Center of circle after perspective transformation*. arXiv:1902.04541 [cs.CV].
- Albert Chern (2019). *A Reflectionless Discrete Perfectly Matched Layer*. J. Computational Physics, Vol. 381, pp. 91–109.

- Albert Chern, Felix Knöppel, Franz Pedit, and Ulrich Pinkall (2018). *Commuting Hamiltonian Flows of Curves in Real Space Forms*. arXiv:1809.01394 [math.DG].
- Albert Chern, Felix Knöppel, Ulrich Pinkall, and Peter Schröder (2018). *Shape from Metric*. ACM Transactions on Graphics, Vol. 37(4), Art. 63.
- Albert Chern (2017). *Fluid Dynamics with Incompressible Schrödinger Flow*, PhD Thesis, California Institute of Technology.
- Albert Chern, Felix Knöppel, Ulrich Pinkall, and Peter Schröder (2017). *Inside Fluids: Clebsch Maps for Visualization and Processing*. ACM Transactions on Graphics, Vol. 36(4), Art. 142.
- Albert Chern, Felix Knöppel, Ulrich Pinkall, Peter Schröder, and Steffen Weißmann (2016). *Schrödinger's Smoke*. ACM Transactions on Graphics, Vol. 35(4), Art. 77.
- Albert Chern, Ulrich Pinkall, and Peter Schröder (2015). *Close-to-Conformal Deformations of Volumes*. ACM Transactions on Graphics, 34(4), Art. 56.
- Albert Chern (2012). *Solving Eigenvalue Problems of the Biharmonic Operator on Manifolds with Boundaries*, Master Thesis, National Taiwan University.
- Albert Chern (2010). *Discrete analysis and optimization of PML boundary condition*. Technical report, NA, KTH Royal Institute of Technology.

Teaching

Instructor

- Spring 2023, *Physics Simulation* (CSE 291), UCSD.
- Winter 2023, *Discrete Differential Geometry* (CSE 274), UCSD.
- Fall 2022, *Computer Graphics* (CSE 167), UCSD.
- Winter 2022, *Discrete Differential Geometry* (CSE 274), UCSD.
- Fall 2021, *Computer Graphics* (CSE 167), UCSD.
- Winter 2021, *Computer Graphics* (CSE 167), UCSD.
- Fall 2020, *Advanced Topics in Computer Graphics – Discrete Differential Geometry* (CSE 274), UCSD.
- Spring 2015, *Intro. to MATLAB and Mathematica* (ACM11), Caltech.

Head Teaching Assistant

- Winter 2017, *Intro. to Methods in Applied Math (Complex Analysis and Initial Value Problems)* (ACM95/100A), Applied and Computational Mathematics, California Institute of Technology.
- Spring 2017, *Intro. to Methods in Applied Math (Boundary Value Problems and Partial Differential Equations)* (ACM95/100B), Applied and Computational Mathematics, California Institute of Technology.

Teaching Assistant

- Fall 2013, 2014, 2016 *Discrete Differential Geometry* (CS177), Computer Science, California Institute of Technology.
- Winter 2015 *Data Visualization* (CS176), Computer Science, California Institute of Technology.
- Winter 2017 *Discrete Differential Geometry II* (CS177B), Computer Science, California Institute of Technology.
- Winter 2014, 2015 *Current Research in Discrete Differential Geometry* (CS176), Computer Science, California Institute of Technology.

- Fall 2013, 2015 *Stochastic Processes* (ACM116), Applied and Computational Mathematics, California Institute of Technology.
- Fall 2014, Winter 2016 *Intro. to Methods in Applied Math (Complex Analysis)* (ACM95/100A), Applied and Computational Mathematics, California Institute of Technology.
- Winter 2014, *Intro. to Methods in Applied Math (Ordinary Differential Equations)* (ACM95/100B), Applied and Computational Mathematics, California Institute of Technology.
- Fall 2011, *Complex Analysis*, Department of Mathematics, National Taiwan University.
- Winter 2015 *Computational Mathematics* (ACM106), Applied and Computational Mathematics, California Institute of Technology.
- Spring 2014, *Intro. to Methods in Applied Math (Partial Differential Equations)* (ACM95/100C), Applied and Computational Mathematics, California Institute of Technology.
- Fall 2011, *Introduction to Computational Mathematics*, Department of Mathematics, National Taiwan University.

Conference Presentations

Chebyshev Nets from Commuting PolyVector Fields
SIGGRAPH Asia Technical Papers — *November 18, 2019*
Brisbane, Australia

Shape from Metric
SIGGRAPH Technical Papers — *August 14, 2018*
Vancouver, Canada

Inside Fluids: Clebsch Maps for Visualization and Processing
SIGGRAPH Technical Papers — *August 3, 2017*
Los Angeles, CA

Schrödinger's Smoke
SIGGRAPH Technical Papers — *July 26, 2016*
Anaheim, CA

Close-to-Conformal Deformations of Volumes
SIGGRAPH Technical Papers — *August 11, 2015*
Los Angeles, CA

Invited Colloquium Talks

GMT for Convexifying and Compactifying Comp. Problems
SIAM CSS Comp. Applied Math Forum — *June 9, 2023*
Claremont, California, and Norman, Oklahoma

Dynamics of Cohomology in Fluids
UCSD MAE Fluid Mechanics Seminar — *April 17, 2023*
La Jolla, California

Cohomology in Fluid Dynamics
KAUST Applied Geometry Workshop — *March 13, 2023*
Thuwal, Saudi Arabia

Geometric Measure Theory for Convexifying and Compactifying Computational Problems
Caltech Keller Colloquium — *November 14, 2022*
Pasadena, California

Geometric Measure Theory & Kelvin Geometry for Convexifying and Compactifying Computational Problems
Workshop on Discrete Geometric Structures *August 31, 2022*
Vienna, Austria

Geometric Measure Theory & Kelvin Geometry for Convexifying and Compactifying Computational Problems
Oberwolfach Workshop *August, 2022*
Oberwolfach, Germany

Geometric Approaches to Infinite Domain Problems
Mathematics Seminar at North Carolina State University *April 6, 2022*
Raleigh, North Carolina

Geometric Structures behind Optimization Problems
CSE Colloquium at UC Riverside *November 5, 2021*
Riverside, California

Geometric Structures behind Optimization Problems
Pixel Cafe Seminar at UCSD *October 29, 2021*
La Jolla, California

Geometric Approaches to Infinite Domain Problems
Caltech CMX Seminar *May 26, 2021*
Pasadena, California

Shape from Metric
Pixel Cafe Seminar at UCSD *April 24, 2020*
La Jolla, California

An Exact Discretization of Reflectionless Boundaries for Wave Equations
Applied Math Seminar at MIT *April 29, 2020*
Cambridge, Massachusetts

Incompressible Schrödinger and Ginzburg–Landau Systems in Computer Graphics
Symposia on Quantum Condensation, Fluids and Information *Nov 22, 2019*
Singapore

Reflectionless Boundary Condition with Discrete Complex Analysis
SFB Workshop 2019 "DGD Days" *September 25, 2019*
Raitenhaslach, Germany

Shape from Metric
ICERM Workshop "Illustrating Geometry and Topology" *September 19, 2019*
Providence, Rhode Island

Bubble Rings and Ink Chandeliers with Kaluza–Klein Geometry
Geometry Workshop at Strobl *September 2, 2019*
Strobl, Austria

Perfectly Matched Layer with Discrete Complex Analysis
DGD Colloquium at TU Berlin and TU Munich *May 7, 2019*
Berlin, Germany

Commuting Hamiltonian Flows of Space Curves
DGD Seminar at TU Berlin *April 23, 2019*
Berlin, Germany

Geometric Approaches in Computational Waves and Fluid Dynamics
Applied Math Seminar at UCLA *April 3, 2019*
Los Angeles, California

Computational Problems from a Geometric Perspective
Colloquium in Computer Science and Engineering at UC San Diego *February 11, 2019*

San Diego, California

Geometric Approaches in Computational Problems
Mathematical Progress in Expressive Image Synthesis (MEIS) *December 9, 2018*
Shibaura Institute of Technology, Tokyo, Japan

Shape from Metric
International Conference on Discretization in Geometry and Dynamics *October 11, 2018*
Döllnsee-Schorfheide, Germany

Geometric Approaches in Computational Problems
IST Austria *June 27, 2018*
Klosterneuburg, Austria

Fluid Dynamics with Geometric Clebsch Variables
University of Bonn *January 30, 2018*
Bonn, Germany

Geometric Clebsch Variables
SFB Workshop on Discretization in Geometry and Dynamics *October 6, 2017*
Raitenhaslach, Germany

Geometric Clebsch Variables
Geometry Workshop at Obergurgl *September 24, 2017*
Obergurgl, Austria

Schrödinger's Smoke
University of Texas at Austin *April 6, 2017*
Austin, Texas

Schrödinger's Smoke
Indiana University *March 27, 2017*
Bloomington, Indiana

Incompressible Schrödinger Flow
Los Alamos National Laboratory *February 22, 2017*
Los Alamos, New Mexico

Schrödinger's Smoke – Fluid Simulations with Hopf Fibration
National Taiwan University, National Chiao Tung University *December 22, 2016*
Taipei and Hsinchu, Taiwan

Fluid Simulation by Incompressible Schrödinger Flow
University of California, Los Angeles *October 19, 2016.*
Los Angeles, CA

Schrödinger's Smoke
Computer Science at TU Berlin *September 7, 2016.*
Berlin, Germany

Schrödinger's Smoke
Weierstrass Institute for Applied Analysis and Stochastics (WIAS) *August 18, 2016.*
Berlin, Germany

Schrödinger's Smoke
KTH Royal Institute of Technology in Stockholm *August 11, 2016.*
Stockholm, Sweden

Incompressible Schrödinger Flow
Berlin International Graduate School in Model and Simulation based Research *July 12, 2016.*
Berlin, Germany

Schrödinger's Smoke
University of California, Irvine *April 6, 2016.*
Irvine, CA

Close-to-Conformal Deformations of Volumes
Oberwolfach Mathematical Research Institute *January 26, 2016.*
Oberwolfach, Germany

Closest Point Methods for PDEs on Surfaces
2011 Workshop on Computational Conformal Geometry and Its Applications *December 24, 2011.*
National Chiao Tung University, Taiwan

Association Memberships

- Oberwolfach Leibniz Graduate Student (OWLG).
- Student member, Association for Computing Machinery (ACM).
- Student member, Society for Industrial and Applied Mathematics (SIAM).

Experiences

Visiting Research

Technische Universität Berlin **Berlin, Germany**
Visiting researcher, Mathematics *Apr. 2016 – Sep. 2016*
Topic: Quantum Mechanical analog of Fluid Dynamics.
Collaborators: Ulrich Pinkall, Peter Schröder, Felix Knöppel.

KTH Royal Institute of Technology **Stockholm, Sweden**
Visiting student, Department of Numerical Analysis (NADA) *July 2010 – Aug. 2010*
Topic: Discrete Analysis and Optimization of a PML Boundary Condition
Supervisor: Olof Runborg.

Personal Skills

Languages

English: excellent command

Mandarin Chinese: native

Japanese: intermediate

German: beginner

Programming languages and softwares

Main computation tools: MATLAB, Python, Houdini VEX

Visualization tools: Houdini FX (VEX and Python), MATLAB, Processing (Java)

Language with experience: C, C++, html/CSS

Other skills

Musical instruments: piano, guitar, Chinese flute, Chinese violin

Sports: Table tennis