Chee Han Tan

Ph.D. Candidate in Mathematics

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Research Interests

Area Applied Mathematics, Fluid Dynamics, Calculus of Variations, Applied Analysis, Partial Differential Equations, Asymptotic and Perturbation Methods, Eigenvalue Problems

Education

2015–present **PhD. in Mathematics**, University of Utah, Salt Lake City, UT.
Advisors: Christel Hohenegger and Braxton Osting
Concentration: Applied Mathematics. *Expected: June 2021*

2011-2015 **Master in Mathematics (MMath)**, *University of Warwick*, Coventry, UK.
First Class Honours
Thesis: Double Obstacle Ginzburg-Landau Functional on Graphs
Advisor: Charles Elliott

Publication

1. **C. H. Tan**, C. Hohenegger, and B. Osting, A variational characterization of fluid sloshing with surface tension, *SIAM Journal on Applied Mathematics*, 77(3), 2017, pp. 995-1019.

Awards

December 2019 **Student Travel Award**, SIAM Conference on Analysis of Partial Differential Equations (PD19)

Summer 2019 **Summer Research Fellowship**, Department of Mathematics, University of Utah

2018 **SIAM Student Chapter Certificate of Recognition**

May 2018 **Graduate Student Travel Funding**, Department of Mathematics, University of Utah

November 2016 **Travel Subsidy Grant**, APS Division of Fluid Dynamics

Talks and Posters

Research Talks

October 2020 *An Isoperimetric Problem for Sloshing with Surface Tension in a Shallow Container*
SIAM Northern States Section Student Chapters Conference 2020
Virtual Conference

December 2019 *An Isoperimetric Problem for Sloshing with Surface Tension in a Shallow Container* (invited minisymposium talk)
SIAM Conference on Analysis of Partial Differential Equations, La Quinta, CA

April 2018 *On the Two-Dimensional Ice-Fishing Problem with Surface Tension*
The First SIAM Wasatch Student Chapters Conference, Salt Lake City, UT

May 2017 *A Variational Characterization of Fluid Sloshing with Surface Tension (Poster)*
Modeling Complex Fluids and Gels for Biological Applications, Salt Lake City, UT

November 2016 *Variational Methods for Sloshing Problems with Surface Tension*
69th Annual Meeting of the APS Division of Fluid Dynamics, Portland, OR

September 2016 *A Variational Characterization of Fluid Sloshing with Surface Tension*
Biofluids Group Meeting, University of Utah

Student Seminars

Applied Math Collective (AMC), University of Utah, USA
AMC is a graduate-student-led seminar, founded by Fernando Guevara Vasquez, Christel Hohenegger, and Braxton Osting. The aim is to provide an informal platform where speaker discusses general interest "SIAM Review"-style applied math papers.

April 2021 *Inverse Eigenvalue Problem for Jacobi Matrices*
October 2020 *Deep Learning - An Introduction for Applied Mathematicians*
January 2019 *A Resolvent Proof of the Perron-Frobenius Theorem*
January 2019 *The Perron-Frobenius Theorem*
November 2018 *Direct Method of the Calculus of Variations and Mountain Pass Lemma*
July 2018 *Schauder Fixed Point Theorem*
February 2018 *Extremal Problems for Laplacian Eigenvalues*
March 2017 *A Simple Model for Cloaking*

Biofluids Group Meeting, University of Utah, USA
April 2021 *Mechanical Approach to Surface Tension and Capillary Phenomena*
October 2020 *Machine Learning for Fluid Mechanics*
March 2019 *Sloshing in a Hele-Shaw Cell: Experiments and Theory*

Conferences and Workshops

Summer 2021 **Séminaire de Mathématiques Supérieures - Microlocal Analysis: Theory and Applications**
Virtual Summer School

April 2021 **paraDIGMS 2021 Spring Conference**
Virtual Conference

October 2020 **SIAM Northern States Section Student Chapters Conference**
Virtual Conference

Dec. 2019 **SIAM Conference on Analysis of Partial Differential Equations (PD19)**
La Quinta Resort & Club, La Quinta, California, USA.

June 2019 **Mathematical Fluids, Materials and Biology Conference**
University of Michigan, Ann Arbor, Michigan, USA.

April 2019 **The Second SIAM Wasatch Student Chapters Conference**
Utah State University, Logan, Utah, USA.

May 2018 **Modeling and Simulation of Interface Dynamics in Fluids/Solids and Their Applications**
Institute for Mathematical Sciences, National University of Singapore, Singapore

April 2018 **The First SIAM Wasatch Student Chapters Conference**
University of Utah, Salt Lake City, Utah, USA.

Nov. 2016 **69th Annual Meeting of the APS Division of Fluid Dynamics**
Oregon Convention Center, Portland, Oregon, USA.

Teaching and Mentorship

2015 - present **Instructor of Record**, University of Utah, USA
Taught a range of undergraduate courses as instructor of record, with full responsibility for syllabi, lectures, exams, and grades.

- MATH 2250 - Differential Equations and Linear Algebra [flipped classroom] (Summer 2021, Spring 2021, Fall 2020)
- MATH 12 - Calculus I Review (Spring 2021, Fall 2020, Spring 2020)
- MATH 1080 - Precalculus [online course] (Summer 2020)
- MATH 1220 - Calculus II [online course] (Spring 2020)
- MATH 1210 - Calculus I [online course] (Fall 2019)
- MATH 1210 - Calculus I (Fall 2018)
- MATH 15 - Precalculus Review (Fall 2018)
- MATH 1050 - College Algebra (Summer 2018, Spring 2018, Summer 2017, Spring 2017)

2015 - 2017 **Lab Teaching Assistant**, University of Utah, USA
Responsible for leading group discussions and grading problem sheets.

- MATH 1310 - Engineering Calculus I (Fall 2017)
- MATH 1321 - Accelerated Engineering Calculus II (Fall 2016)
- MATH 2250 - Differential Equations and Linear Algebra (Fall 2015, Spring 2016)

Mentor for Undergraduate Research, University of Utah, USA
Held weekly meetings, aided in project development, and guided students in presenting research findings.

2019 - 2020 ACCESS and REU Mentor to Emma Coates with Christel Hohenegger and Nathan Willis on a year long project. Project: Numerical Study on Containers Optimising Sloshing Frequencies.

2016 - 2017 REU Mentor to Max Carlson with Braxton Osting and Christel Hohenegger on a 1.5 year long project. Project: 3D Numerical Simulations of Linear Fluid Sloshing with Surface Tension.

- Max gave a 5-minute presentation at the Department of Mathematics Awards Ceremony in Spring 2017.
- Max is currently a graduate student in the School of Computing at the University of Utah.

Spring 2020 **Mentor for Undergraduate Directed Reading Program**, University of Utah, USA
Mentor to Jameson McCarthy on an independent reading course on numerical weather prediction. Held weekly meetings to discuss assigned exercises and readings.

2014-2015 **Supervisor for Undergraduate Student**, University of Warwick, UK
Supervising 10 - 15 first year undergraduates on Analysis, Linear Algebra, Geometry and Motion, Differential Equations, Foundations, Introduction to Abstract Algebra. Held weekly group meetings and graded all homework assignments.

Computer Skills

MATLAB, Mathematica, LaTeX

Service and Outreach

2018 - present **Society for Industrial and Applied Mathematics (SIAM) Student Chapter**, University of Utah, USA

President (2018 - 2020). Organization of meetings, team management. Official contact person for the organization. Organizing events included:

- Applied math graduate students' mini talk in the undergraduate math colloquium.
- Day trip visit to Idaho National Laboratory.
- LaTeX workshop.
- Social events such as celebrating Riemann's birthday, e-day, and π-day and math movie night.
- Applied math + math final exam prep.

Treasurer and Webmaster (2018). Managing Chapter funds and maintaining Chapter webpage. Organizing events included:

- Initiation of the First SIAM Wasatch Student Chapters Conference in April 2018. The aim of this conference is to cultivate connections amongst early career applied math students and researchers and faculty members from Wasatch Universities (such as Utah State University and Brigham Young University).
- Applied math final exam prep.

2018 - present **Association for Women in Mathematics (AWM) Student Chapter**, University of Utah, USA

Speaker Series co-chair (2020 - present).

- Inviting two mathematicians from an underrepresented group each semester to the University of Utah for a 2-3 day visit.
- Giving two talks: one on their career experiences and one on their research. Social hours with AWM members.

Mentor (2018 - 2019, 2020 - present). Paired with undergraduate student throughout year to meet monthly to discuss semester, future plans, graduate school decisions.

2015 - present **Graduate Student Advisory Committee (GSAC)**, University of Utah, USA

Peer Mentor (2018 - present).

- Program pairing incoming graduate students with a more experienced graduate student to support them during their first year of graduate school.

Intramural sports committee (2019 - 2020).

- Organizing math graduate student intramural teams such as basketball, inner tube water polo, soccer, etc.

Student Contact for Applied Mathematics (2017 - 2019)

Seminars Organizer, University of Utah, USA

2020 - present, 2017 - 2019 **Applied Math Collective (AMC) Student Seminar**

Spring 2019 **Convex Analysis Learning Seminar**
- Guidance from Braxton Osting. We read R. T. Rockafellar "Convex Analysis", Parts I - III, IV.

Fall 2018 **Sobolev Space Learning Seminar**
- Guidance from Fernando Guevara Vasquez, Christel Hohenegger, and Akil Narayan. We read L. C. Evans "Partial Differential Equations", Chapter 5 and Chapter 6.

Panels, University of Utah, USA

August 2020 **Online Teaching**, Department of Mathematics TA Training

March 2020 **Graduate Student Panel**, GSAC Recruitment Weekend

October 2019 **Life as a Math Graduate Student**, AWM + USAC

August 2019 **American Education: What to Expect From Your Students**, Department of Mathematics TA Training

February 2019 **Graduate Student Panel**, Honors College

March 2017 **Graduate Student Panel**, GSAC Recruitment Weekend

K–12 Outreach

February 2020 8th graders, Defining Your Path - Field Trip Program, University of Utah

April 2018 Presentation about how to overcome cultural barriers in mathematics, East High School, UT

Outreach Talks

GSAC Colloquium, University of Utah

February 2020 *When In Doubt, Nondimensionalise*

April 2019 *Royal Rumble Micro Talks*

November 2016 *Sloshing Problems: How to Solve PDEs Using Calculus of Variations?*

Undergraduate Student Colloquium, University of Utah

February 2020 *Can we find the optimal shallow canal having the largest principal sloshing frequency?* (SIAM Student Chapter - Graduate Students' Mini Talks)

September 2019 *Isoperimetric Problem and the Calculus of Variations*

2017 National SACNAS Conference, University of Utah, Salt Lake City, UT

October 2017 *A Variational Characterization of Fluid Sloshing with Surface Tension (Poster)*

Professional Affiliations

Society for Industrial and Applied Mathematics (SIAM)

Associations for Women in Mathematics (AWM)

American Mathematical Society (AMS)