

SON N.T. TU

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December 25, 2024

Research Interests: Hamilton–Jacobi equations, free boundary problems, integro-differential equations, optimal control, homogenization, dynamical systems

Appointments

- *Visiting Assistant Professor* Aug 2022 – Present
Department of Mathematics, Michigan State University (MSU), East Lansing, MI
Mentor: Olga Turanova
- *Teaching Assistant* 2015 – 2016
Vietnam National University, Ho Chi Minh City (VNU-HCMC), Vietnam
- *Applied Mathematician and Data Scientist (Internship)* Jan 2022 – May 2022
Ordinal Science, Madison, WI

Education

- Mathematics Ph.D., University of Wisconsin-Madison (UW-Madison) 2016 – 2022
Advisor: Hung Tran
- B.S. Honor program in Mathematics, University of Science, VNU-HCMC 2011 – 2015

Publications and Preprints

In Submission

9. Russell Schwab, **Son N. T. Tu**, and Olga Turanova, *Well-posedness for viscosity solutions of the one-phase Muskat problem in all dimensions*. Submitted (2024) · [arxiv:2404.10972](https://arxiv.org/abs/2404.10972) [math.AP]

Published

8. Bingyang Hu, **Son N. T. Tu**, and Jianlu Zhang, *Polynomial convergence rate for quasiperiodic homogenization of Hamilton–Jacobi equations*. (Accepted) [Communications in Partial Differential Equations \(2024\)](#) · [arXiv:2405.11516](https://arxiv.org/abs/2405.11516) [math.AP]
7. **Son N.T. Tu** and Jianlu Zhang, *On the regularity of stochastic effective Hamiltonian*. (To appear) [Proceedings of the American Mathematical Society \(2024\)](#) · [arxiv:2312.15649](https://arxiv.org/abs/2312.15649) [math.AP]
6. **Son N.T. Tu** and Jianlu Zhang, *Generalized convergence of solutions for nonlinear Hamilton–Jacobi equations with state-constraint*. [Journal of Differential Equations 406 \(Oct. 2024\), 87-125](#)
5. Farid Bozorgnia, Dohyun Kwon, and **Son N.T. Tu**, *The regularity with respect to domains of the additive eigenvalues of superquadratic Hamilton–Jacobi equation*. [Journal of Differential Equations, 402, \(Sep. 2024\), 518-553](#)
4. Yuxi Han and **Son N.T. Tu**, *Remarks on the vanishing viscosity process of state-constraint Hamilton–Jacobi equations*. [Applied Mathematics & Optimization, 86\(3\) \(Jun. 2022\)](#)
3. **Son N.T. Tu**, *Vanishing discount for Hamilton–Jacobi equation in nested domains*. [Journal of Differential Equations, 317, \(Apr. 2022\), 32-69](#)
2. Yeon-Eung Kim, Hung Vinh Tran, and **Son N.T. Tu**, *State-constraint static Hamilton–Jacobi equations in nested domains*. [SIAM Journal on Mathematical Analysis, 52\(5\) \(Sep. 2020\), 4161–4184](#)
1. **Son N.T. Tu**, *Rate of Convergence for Periodic Homogenization of Convex Hamilton–Jacobi Equations in One Dimension*. [Asymptotic Analysis, 121\(2\) \(Jan. 2021\), 171–194](#)

Refereed conference proceedings & papers

1. Thu Nguyen, Quang M. Le, **Son N.T. Tu**, and Binh Nguyen, *Unequal Covariance Awareness for Fisher Discriminant Analysis and Its Variants in Classification*. [2022 International Joint Conference on Neural Networks \(IJCNN\)](#), (Jul. 2022)

Awards and Honors

- *Research Travel Support from the Office of Postdoctoral Affairs, MSU* 2024
- *2023–2024 Postdoctoral Prize for Excellence in Teaching, Department of Mathematics, MSU* 2024
- *Teaching Assistant Superior Rating* FA 2017, FA 2018, FA 2019, FA 2020
Mathematics Department, UW-Madison
- *Graduate Research Travel Grant, Graduate School, UW-Madison* 2021
- *GSSC Fellowship, Graduate School, UW-Madison* 2021
- *Excellence in Research Award, Mathematics Department, UW-Madison* 2020
- *Outstanding Teaching Assistant Award, Mathematics Department, UW-Madison* 2020
- *Vietnam Education Foundation (VEF) Fellowship (declined)* 2016
- *Valedictorian Award, University of Sciences, VNU-HCMC, Vietnam* 2015
- *Third prize, Vietnam Mathematical Olympiad (VMO)* 2011
- *World Finalist, Shing-Tung Yau High School Mathematics Awards, Beijing, China* 2010

Professional Services

- *Referee for Mathematics Journals: Journal of Mathematical Physics (JMP), Journal of Geometric Analysis (JGA), Discrete and Continuous Dynamical Systems (DCDS), Proceedings of the American Mathematical Society (PAMS)*
- *Co-organizer: AMS 2025 Spring Central Sectional Meeting, University of Kansas* Mar 29-30, 2025
- *Co-organizer, Madison PDEs Conference, UW-Madison*
(Originally scheduled for April 2020; canceled due to COVID-19)
- *Co-organizer, AMS Student Chapter Seminar, UW-Madison* 2018–2019

Outreach

- (Scheduled) *Interactive STEM demonstration* Mar 2025
for middle school students, as part of the *Girls Math and Science Day, MSU*
- *Lead an interactive STEM demonstration table on "Soap Bubbles and Minimal Surfaces"* Mar 09, 2024
for middle school students, as part of the *Girls Math and Science Day, MSU*
- *Judge for University Undergraduate Research and Arts Forum 2023 (UURAF 2023), MSU* Apr 14, 2023

Undergraduate Research Mentoring

- *Undergraduate Research Mentor* for Minh Nguyen, MSU Summer 2024 – Summer 2025
Uniqueness set for Hamilton-Jacobi equations with state-constraints
Awarded *College of Natural Science Undergraduate Research Support Scholarship* for Summer 2024.
- *Directed Studies* (MTH490): Minh Nguyen, MSU Spring 2024
Topic: *Optimal control theory and viscosity solutions to Hamilton–Jacobi equations*
with *Best Presentation Award* at the *21st Math Student Conference*, MSU
- *Directed Reading Program*: William Robert Korbitz and Luanda Cai, UW-Madison Spring 2019
Topic: *Optimal Control for Linear Systems*
- *Undergraduate PDEs Summer School*: Daotong Ge and Hangyu Pi, UW-Madison Summer 2017
Co-mentored with Hung Tran

Teaching Experience

Michigan State University	Role	# Students	Term
Topic in Optimal Control Theory, MTH 496-002 (Capstone course)	Instr. of Record	21	Spring 2025
Multivariable Calculus, MTH 234	Instr. of Record	191	Fall 2024
Matrix Algebra with Computational Applications, MTH/CMSE 314	Instr. of Record	30	Summer 2024
Directed Reading, MTH 490 (Introduction to Optimal Control Theory)	Instr. of Record	1	Spring 2024
Multivariable Calculus, MTH 234	Instr. of Record	170	Spring 2024
Multivariable Calculus, MTH 234	Instr. of Record	60	Fall 2023
Linear Algebra and Application to Data Science, MTH/CMSE 314	Instr. of Record	60	Spring 2023
Linear Algebra and Application to Data Science, MTH/CMSE 314	Instr. of Record	60	Fall 2022
University of Wisconsin–Madison	Role	# Students	Term
College Algebra, Math 112	Instr. of Record	60	Fall 2021
College Algebra, Math 112	Instr. of Record	30	Spring 2021
Undergraduate PDE, Math 619	Teaching Assistant	~ 30	Spring 2021
Business Calculus, Math 211	Recitation Instr.	~ 30	Fall 2020
Mathematical Analysis I, Math 521	Teaching Assistant	~ 30	Summer 2020
College Algebra, Math 112	Recitation Instr.	~ 60	Fall 2019
Multi-variable Calculus, Algebra & Differential Equations, Math 375	Recitation Instr.	~ 30	Spring 2019
Multi-variable Calculus, Algebra & Differential Equations, Math 376	Recitation Instr.	~ 30	Fall 2018
Business Calculus, Math 211	Recitation Instr.	~ 60	Fall 2017
Linear Algebra & Differential Equations, Math 319	Recitation Instr.	~ 60	Spring 17
Multi-variable Calculus 2, Math 222	Recitation Instr.	~ 60	Fall 2016
Vietnam National University, HCMC	Role	# Students	Term
Calculus II, MATH2153 (Excellent Program - Univ. of Informatics)	Recitation Instr.	~ 60	Spring 2016
Calculus III, MATH253 (Adv. Comp. Sci. - Univ. of Science)	Recitation Instr.	~ 60	Fall 2015

Selected Presentations

Selected Invited talks

21. PDEs Seminar, University of Tennessee - Knoxville

Nov 07, 2024

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| 20. Colloquium, Minnesota State University - Mankato | Oct 29, 2024 |
| 19. Analysis Seminar, University of Maryland, College Park | Oct 24, 2024 |
| 18. Analysis and PDE Seminar, Michigan State University | Oct 16, 2024 |
| 17. (Online) Analysis Seminar, Texas Tech University | Oct 14, 2024 |
| 16. Mini-workshop: Summer School in PDEs and Applications 2024, VIASM and SGU | Jul 27, 2024 |
| 15. (Online) Virtual Student PDEs Seminar, UW–Madison | May 30, 2024 |
| 14. PDEs Seminar, The Ohio State University | Apr 09, 2024 |
| 13. (Online) Seminars on Analysis and Stochastic Analysis, Auburn University | Mar 27, 2024 |
| 12. (Online) Early Career Math Colloquium, University of Arizona | Mar 21, 2024 |
| 11. SIAM Great Lakes Meeting (SIAMGL) 2023, Michigan State University
Minisymposium: Nonlinear PDEs & Optimal Transport with Applications | Oct 15, 2023 |
| 10. Differential Equations and Nonlinear Analysis Seminar, North Carolina State University | Nov 09, 2023 |
| 9. Applied Analysis Seminar, Stingham University, China | August 03, 2023 |
| 8. Analysis Seminar, University of Science, VNU-HCMC | Jun 20, 2023 |
| 7. Madison PDEs Conference, UW-Madison | May 15-19, 2023 |
| 6. (Online) Academy of Mathematics and Systems Science, Chinese Academy of Science | Apr 19, 2023 |
| 5. (Online) Academy of Mathematics and Systems Science, Chinese Academy of Science | Apr 26, 2023 |
| 4. Applied Math Seminar, University of North Carolina - Charlotte | Sep 24, 2021 |
| 3. (Online) Graduate School of Mathematical Sciences, The University of Tokyo | Oct 27, 2020 |
| 2. PDEs and Geometric Analysis Seminar, UW-Madison | Sep 23, 2019 |
| 1. 11th Summer Meeting Conference, University of Science, VNU-HCMC | Jul 30, 2019 |

Selected Contributed Talks & Posters

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| 8. Poster : IMSI's workshop Mathematical Modeling of Biological Interfacial Phenomena
The Institute for Mathematical and Statistical Innovation, University in Chicago | Dec 09 – 13, 2024 |
| 7. Boston University / Keio University / Stingham University Workshop 2024
on Differential Equations, Dynamical Systems and Applied Mathematics | Jun 01, 2024 |
| 6. Analysis and PDE Seminar, Michigan State University | Apr 17, 2024 |
| 5. 88 th Midwest PDEs Seminar, The Ohio State University | Apr 26 – 28, 2024 |
| 4. Poster : 8th Annual Scholar Showcase
Office of International Students and Scholars, Michigan State University | Apr 06, 2024 |
| 3. Concentration week on Geometry and Analysis, University of Texas A&M | Jul 29, 2022 |
| 2. Geometric and Harmonic Analysis 2019, University of Connecticut | Mar 30, 2019 |
| 1. Poster : CNA Workshop 2019: Mathematical Models for Pattern formation
Carnegie Mellon University | Mar 08, 2019 |

Selected Conferences, Workshops Attended, & Research Visits

5. (Scheduled) AIM workshop: *Integro-differential equations in many-particle interacting systems* Apr 14 – 18, 2025
American Institute of Mathematics
Richard N. Merkin Center for Pure and Applied Mathematics, Caltech
4. (Scheduled) AMS 2025 Spring Central Sectional Meeting, University of Kansas Mar 29-30, 2025
3. IMSI's workshop *Mathematical Modeling of Biological Interfacial Phenomena* Dec 09 – 13, 2024
The Institute for Mathematical and Statistical Innovation, University in Chicago
2. University of Seoul, hosted by Dohyun Kwon Jul 04 – 08, 2024
1. Chinese Academy of Science, hosted by Jianlu Zhang Jul 26 – Aug 07, 2023

Other Skills

- Computing Proficiency: Python, Matlab, Linux