

# SON N.T. TU

tuson@msu.edu · <https://tunguyenthaison.github.io>

February 05, 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
- Teaching Assistant 2015 – 2016  
Vietnam National University, Ho Chi Minh City (VNU-HCMC), Vietnam

## 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". *Communications in Partial Differential Equations* 50, no. 1–2 (February 1, 2025): 211–44.
7. **Son N.T. Tu** and Jianlu Zhang. "On the regularity of stochastic effective Hamiltonian". *Proceedings of the American Mathematical Society* 153 (2025), pp. 1191–1203.
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

- *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
- *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)*

## Outreach

- (Scheduled) *Interactive STEM demonstration* Mar 01, 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	22	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*

- |   |                |
|---|----------------|
| 22. Workshop: "Recent progress in Hamilton–Jacobi equations and related topics" | June 2-6, 2025 |
| Nanjing, China  |                |
| 21. PDEs Seminar, University of Tennessee - Knoxville                           | Nov 07, 2024   |
| 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<br>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*

- |   |                   |
|---|-------------------|
| 8. <a href="#">Poster</a> : IMSI's workshop Mathematical Modeling of Biological Interfacial Phenomena<br>The Institute for Mathematical and Statistical Innovation, University in Chicago | Dec 09 – 13, 2024 |
| 7. Boston University / Keio University / Stingham University Workshop 2024<br>on Differential Equations, Dynamical Systems and Applied Mathematics  | Jun 01, 2024      |
| 6. Analysis and PDE Seminar, Michigan State University  | Apr 17, 2024      |
| 5. 88 <sup>th</sup> Midwest PDEs Seminar, The Ohio State University   | Apr 26 – 28, 2024 |
| 4. <a href="#">Poster</a> : 8th Annual Scholar Showcase<br>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. <a href="#">Poster</a> : CNA Workshop 2019: Mathematical Models for Pattern formation<br>Carnegie Mellon University  | Mar 08, 2019      |

#### **Selected Conferences, Workshops Attended, & Research Visits**

- |  |                       |
|--|-----------------------|
| 5. (Scheduled) American Institute of Mathematics<br>AIM workshop: <i>Integro-differential equations in many-particle interacting systems</i><br>Richard N. Merkin Center for Pure and Applied Mathematics, Caltech | Apr 14 – 18, 2025     |
| 4. (Scheduled) AMS 2025 Spring Central Sectional Meeting, University of Kansas   | Mar 29-30, 2025       |
| 3. IMSI's workshop <i>Mathematical Modeling of Biological Interfacial Phenomena</i><br>The Institute for Mathematical and Statistical Innovation, University in Chicago  | Dec 09 – 13, 2024     |
| 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