SON NGUYEN THAI TU

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Research Interest

- Nonlinear partial differential equations, free boundary problems, Hamilton-Jacobi equations, optimal control, homogenization, dynamical systems.

Academic Appointments

- *Visiting Assistant Professor*. Department of Mathematics, Michigan State University, East Lansing, MI. August 2022 - present. Mentor: Olga Turanova.

Education

- University of Wisconsin-Madioson, Madison, WI.
  Mathematics Ph.D., received August 2022. Advisor: Hung Vinh Tran.

- University of Science, Vietnam National University, Ho Chi Minh City.
  Mathematics B.S., received October 2015; honors in Mathematics & Computer Science.

Publications and Preprints

Journals and preprints.

9. Russell Schwab, Son N. T. Tu and Olga Turanova.
   Work in progress.
   In preparation (2023).

8. Son N. T. Tu and Bingyang Hu.
   Work in progress.
   In preparation (2024).

7. Son N.T. Tu and Jianlu Zhang.
   On the regularity of stochastic effective Hamiltonian
   Submitted (2023), https://arxiv.org/abs/2312.15649.

6. Son N.T. Tu and Jianlu Zhang.
   Generalized convergence of solutions for nonlinear Hamilton–Jacobi equations with state-constraint.
   Submitted (2023), arxiv:2303.17058.

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.
Submitted (2022), arXiv:2210.05544.

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, 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

- Awarded superior rating for teaching by UW-Madison Math Department (Fall 2017, Fall 2018, Fall 2019, and Fall 2020) as a Teaching Assistant.
- 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, nominee (2016).
- Valedictorian Award, University of Sciences, Vietnam National University, HCMC, (2015).
- Third prize, Vietnam Mathematical Olympiad (VMO), (2011).
- World Finalist, Shing-Tung Yau High School Mathematics Awards, Beijing, China, (2010).

Talks

19. **Scheduled Invited talk:** *Generalized Convergence of Hamilton–Jacobi equations with state-constraint*, Differential Equations and Nonlinear Analysis seminar, North Carolina State University, (Nov 2023).

18. **Scheduled Invited talk:** *Remarks on the rate of convergence for vanishing viscosity procedure*, Minisymposium: Recent Advances in the Analysis of Partial Differential Equations, SIAM Great Lakes Meeting (SIAMGL) 2023, Michigan State University, (Oct 2023).

17. **Scheduled Invited talk:** *Generalized convergence of solutions to contact Hamilton–Jacobi equations with state-constraint*, Minisymposium: Nonlinear partial differential equations and optimal transport with applications , SIAM Great Lakes Meeting (SIAMGL) 2023, Michigan State University, (Oct 2023).

16. **Invited talk:** *Generalized convergence of solutions to contact Hamilton–Jacobi equations with state-constraint*, Applied Analysis seminar, Stinghua University, (August 2023).

15. **Invited talk:** *Generalized convergence of solutions to contact Hamilton–Jacobi equations with state-constraint*, Analysis Seminar, University of Science, Vietnam National University, (June 2023).

14. **Invited talk:** *Generalized convergence of solutions to contact Hamilton–Jacobi equations with state-constraint*, Madison PDEs conference, UW-Madison, (May 2023).

13. **Online Invited talk:** *The regularity with respect to domains of the additive eigenvalues of superquadratic Hamilton–Jacobi equation*, Academy of Mathematics and Systems Science, Chinese Academy of Science, (Apr 2023).

12. **Online Invited talk:** *Remarks on the rate of convergence for vanishing viscosity procedure*, Academy of Mathematics and Systems Science, Chinese Academy of Science, (Apr 2023).

11. Contributed Talk: *Remarks on rate of vanishing viscosity for Hamilton–Jacobi equations*, Concentration week on Geometry and Analysis, University of Texas A&M, (July 2022).

10. **Invited talk:** *Remarks on the rate of convergence for vanishing viscosity procedure, Physical Applied Math Seminar*, UW-Madison (Oct. 2021).

9. **Invited talk:** *Remarks on the rate of convergence for vanishing viscosity procedure*, Applied Math Seminar, UNC-Charlotte (Sep. 2021).

8. **Online Invited talk:** *Vanishing discount problems for Hamilton–Jacobi equations on changing domains*, Graduate School of Mathematical Sciences, The University of Tokyo, (Oct. 2020).

7. *Two-scale convergence and homogenization*, Physical Applied Math seminar, UW-Madison (Apr. 2020).

6. *State constraints static Hamilton–Jacobi equations in nested domains*, Physical Applied Math seminar, UW-Madison, (Sep. 2019).

5. **Invited talk:** *State constraints static Hamilton–Jacobi equations in nested domains*, PDE and Geometric Analysis seminar, UW-Madison, (Sep. 2019).

4. **Invited talk:** *State constraints static Hamilton–Jacobi equations in nested domains*, Summer meeting 2019, University of Science, Vietnam National University, (Jul. 2019).

3. Contributed Talk: *Some recent works on homogenization of Hamilton–Jacobi equations*, Geometric and Harmonic Analysis 2019, University of Connecticut, (Mar 2019).

2. *Poster: Homogenization of Hamilton–Jacobi equation: Rate of convergence*, CNA Workshop 2019: Mathematical Models for Pattern fomation, Carnegie Mellon University, (Mar 2019).

1. **Invited talk:** *Rate of convergence for periodic homogenization of convex Hamilton–Jacobi equations in one dimension*, Physical Applied Math seminar, UW-Madison, (Sep. 2018).

Research Mentoring & Service

- *Directed Studies*: MTH490 Spring 2024: Optimal Control Theory and Hamilton–Jacobi equations: mentoring undergraduates, Michigan State University.
- Referee for mathematics journal:
  - *The Journal of Geometric Analysis* (`https://www.springer.com/journal/12220`)
  - *Discrete and Continuous Dynamical Systems* (`https://www.aimsciences.org/DCDS`)
- Judging for UURAF 2023 (*University Undergraduate Research and Arts Forum 2023*), Michigan State University.

- Co-organizer, *AMS Student Chapter Seminar*, UW-Madison from 2018-2019.
- *Directed Reading Program:* UW-Madison, Spring 2019. Mentoring two undergraduate students at UW-Madison: William Robert Korbitz and Luanda Cai on Optimal Control for linear systems.
- *Undergraduate PDE summer school*, UW-Madison, Summer 2017. Served as an assistant mentor for Hung Tran, mentoring two undergraduate students at UW-Madison: Daotong Ge and Hangyu Pi.

Teaching

Michigan State University.

- Spring 2024: Directed Studies, MTH 490: Optimal Control Theory and Hamilton–Jacobi equations, two undergraduate students.
- Spring 2024: Multivariable Calculus, MTH 234, large lecture.
- Fall 2023: Multivariable Calculus, MTH 234, two sections.
- Spring 2023: Linear algebra and application to data science, MTH/CMSE 314, two sections.
- Fall 2022: Linear algebra and application to data science, MTH/CMSE 314, one section.

University of Wisconsin–Madison.

- Instructor: Summer 2021, Fall 2021: College algebra, Math 112.
- Teaching Assistant:
  - Spring 2021: Undergraduate PDE, Math 619.
  - Summer 2020: Mathematical Analysis I, Math 521.
  - Fall 2020: Business Calculus, Math 211.
  - Fall 2019: College algebra, Math 112.
  - Fall 2018, Spring 2019: Multi-variable Calculus, Algebra & Differential Equations, Math 375, 376.
  - Fall 2017: Business Calculus, Math 211.
  - Spring 2017: Linear Algebra & Differential Equations, Math 319.
  - Fall 2016: Calculus 2, Math 222.

Vietnam National University.

- 2015–2016: Teaching assistant for MATH2153 (Calculus II), MH253 (Calculus III), Vietnam National University, HCMC.

References

- Olga Turanova, Assistant Professor of Mathematics.
  Mathematics Department, Michigan State University.
  Email: turanova@msu.edu
  Website: https://sites.google.com/msu.edu/turanova/home
- Hiroyoshi Mitake, Associate Professor of Mathematics.
  Graduate School of Mathematical Science, The University of Tokyo.
  Email: mitake@ms.u-tokyo.ac.jp
  Website: https://www.ms.u-tokyo.ac.jp/teacher_e/mitake_e.html.

- Hung Tran, Professor of Mathematics.
  Mathematics Department, University of Wisconsin–Madison.
  Email: hung@math.wisc.edu
  Website: https://people.math.wisc.edu/~htran24/

- Hitoshi Ishii,
  Research Fellow, Institute for Mathematics and Computer Science, Tsuda University, Tokyo.
  Professor Emeritus, Faculty of Education and Integrated Arts and Sciences, Waseda University
  Email: hitoshi.ishii@waseda.jp
  Website: http://www.f.waseda.jp/hitoshi.ishii/