

Hung Vinh Tran

Contact information

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Professional Preparation

- Ph.D. in Mathematics, University of California Berkeley, US, 2008-2012.
- B.S. Honor program in Mathematics, University of Science, Ho Chi Minh city, Vietnam, 2002-2006.

Employment

- 2019-present: Associate Professor, Department of Mathematics, University of Wisconsin Madison.
- 10/2020-present: Distinguished Associate Member, Vietnam Institute for Advanced Study in Mathematics (VIASM), Vietnam (no salary).
- 2015-2019: Assistant Professor, Department of Mathematics, University of Wisconsin Madison.
- 2012-2015: Dickson Instructor, Department of Mathematics, The University of Chicago.
- 2009-2012: Graduate Student Instructor/Researcher, Department of Mathematics, University of California Berkeley.

Research interests

- Partial Differential Equations.

Selected grants, honors & awards

- Simons Fellowship, academic year 2021-2022.
- co-PI, RTG: Analysis and Partial Differential Equations at the University of Wisconsin, NSF DMS-2037851, 2021-2026.
- NSF CAREER award DMS-1843320, 2019-2024.
- Honored Instructor, UW Madison University Housing (Fall 2018, Spring 2019).
- Distinguished paper award, International Consortium of Chinese Mathematicians (ICCM), for paper [25], 2017.
- NSF grant DMS-1664424 (PI), 2017-2020.
- NSF grants DMS-1361236, DMS-1615944 (PI), 2014 - 2017.
- Graduate Division Summer Grants, UC Berkeley, Summers 2011, 2012.
- SIAM travel award, 11/2011.
- Vietnam Education Foundation (VEF) fellowship, 2008-2010.
- Valedictorian, Mathematics department, University of Science, 2006.
- First prize, National Mathematical Olympiad for Students (Analysis), Vietnam, 2003.
- Silver Medal, Asian Pacific Mathematical Olympiad (APMO), 2002.

Publications

47. M. Klibanov, L. H. Nguyen, H. V. Tran, Numerical viscosity solutions to Hamilton-Jacobi equations via a Carleman estimate and the convexification method, arXiv:2104.05870 [math.NA].
46. T. Sprekeler, H. V. Tran, Optimal convergence rates for elliptic homogenization problems in nondivergence-form: analysis and numerical illustrations, arXiv:2009.11259 [math.AP].
45. H. V. Tran, Selection problems in Large Deviations in Games under the logit choice protocol, arXiv:2008.01713 [math.AP], preprint.
44. D. Gomes, H. Mitake, H. V. Tran, The large time profile for Hamilton–Jacobi–Bellman equations, arXiv:2006.04785 [math.AP].
43. H. Mitake, H. V. Tran, T.-S. Van, Large time behavior for a Hamilton-Jacobi equation in a critical Coagulation-Fragmentation model, arXiv:2004.13619 [math.AP], *Comm Math Sci.*, Vol. 19, No. 2, pp. 495–512.

42. X. Guo, H. V. Tran, Y. Yu, Remarks on optimal rates of convergence in periodic homogenization of linear elliptic equations in non-divergence form, *SN Partial Differential Equations and Applications*, (2020) 1:15.
41. H. V. Tran, T.-S. Van, Coagulation-Fragmentation equations with multiplicative coagulation kernel and constant fragmentation kernel, arXiv:1910.13424 [math.AP], *Comm. Pure Appl. Math*, doi/10.1002/cpa.21979.
40. W. Jing, H. V. Tran, Y. Yu, Effective fronts of polytope shapes, *Minimax Theory and its Applications*, 05 (2020), No. 2, 347–360.
39. Y. Kim, H. V. Tran, S. N. T. Tu, State-constraint static Hamilton-Jacobi equations in nested domains, *SIAM J. Math. Anal.*, 52(5), 4161–4184.
38. Y. Giga, H. Mitake, H. V. Tran, Remarks on large time behavior of level-set mean curvature flow equations with driving and source terms, *DCDS-B*, 2020, 25 (10) : 3983-3999.
37. X. Guo, J. Peterson, H. V. Tran, Quantitative homogenization in a balanced random environment, arXiv:1903.12151 [math.PR], submitted.
36. W. Jing, H. Mitake, H. V. Tran, Generalized ergodic problems: existence and uniqueness structures of solutions, *J. Differential Equations*, 268(2020), 2886–2909.
35. Y. Giga, H. V. Tran, L. Zhang, On obstacle problem for mean curvature flow with driving force, *Geometric Flows*, 4 (2019) 9–29.
34. Y. Giga, H. Mitake, T. Ohtsuka, H. V. Tran, Existence of asymptotic speed of solutions to birth and spread type nonlinear partial differential equations, *Indiana University Math Journal*, 2021, Vol 70(1), 121–156.
33. W. H. Sandholm, H.V. Tran, S. Arigapudi, Hamilton-Jacobi Equations with Semi-linear Costs and State Constraints, with Applications to Large Deviations in Games, *Mathematics of Operations Research*, accepted.
32. H. Mitake, H. V. Tran, On uniqueness sets of additive eigenvalue problems and applications, *Proc. Amer. Math. Soc.*, 146, no 11, 4813–4822.
31. H. Mitake, H. V. Tran, Y. Yu, Rate of convergence in periodic homogenization of Hamilton-Jacobi equations: the convex setting, *Arch. Ration. Mech. Anal.*, 2019, Volume 233, Issue 2, pp 901–934.
30. H. V. Tran, Y. Yu, A rigidity result for effective Hamiltonians with 3-mode periodic potentials, *Advances in Math.*, 334, 300–321.
29. H. Ishii, P. E. Souganidis, H. V. Tran, On the Langevin equation with variable friction *Calculus of Variations and PDE*, (2017) 56: 161.

28. J. Qian, H. V. Tran, Y. Yu, Min-max formulas and other properties of certain classes of nonconvex effective Hamiltonians, *Math. Ann.* (2018) 372: 91.
27. H. V. Tran, A Note on Nonconvex Mean Field Games, *Minimax Theory and its Applications*, 3 (2018), no. 2, 323–336.
26. H. Ishii, H. Mitake, H. V. Tran, The vanishing discount problem and viscosity Mather measures. Part 2: boundary value problems. *J. Math. Pures Appl.*, 108 (2017), no. 3, 261–305.
25. W. Jing, P. E. Souganidis, H. V. Tran, Stochastic homogenization of viscous superquadratic Hamilton-Jacobi equations in dynamic random environment, *Res. Math. Sci.* (2017) 4:6.
24. D. Gomes, H. Mitake, H. V. Tran, The Selection problem for discounted Hamilton-Jacobi equations: some non-convex cases, *Journal of the Mathematical Society of Japan*, 70, no 1 (2018), 345–364.
23. H. Ishii, H. Mitake, H. V. Tran, The vanishing discount problem and viscosity Mather measures. Part 1: the problem on a torus. *J. Math. Pures Appl.* (9), 108 (2017), no. 2, 125–149.
22. W. Jing, H. V. Tran, Y. Yu, Inverse problems, non-roundedness and flat pieces of the effective burning velocity from an inviscid quadratic Hamilton-Jacobi model, *Nonlinearity*, 30 (2017) 1853–1875.
21. Y. Giga, H. Mitake, H. V. Tran, On asymptotic speed of solutions to level-set mean curvature flow equations with driving and source terms, *SIAM J. Math. Anal.* 48 (5), 3515–3546.
20. S. Luo, H. V. Tran, Y. Yu, Some inverse problems in periodic homogenization of Hamilton-Jacobi equations, *Arch. Ration. Mech. Anal.* 221 (2016), no. 3, 1585–1617.
19. H. Mitake, A. Siconolfi, H. V. Tran, N. Yamada, A Lagrangian Approach to Weakly Coupled Hamilton-Jacobi Systems, *SIAM J. Math. Anal.* 48(2), 821–846.
18. S. N. Armstrong, H. V. Tran, Y. Yu, Stochastic homogenization of nonconvex Hamilton-Jacobi equations in one space dimension, *J. Differential Equations* 261 (2016), 2702–2737.
17. H. Mitake, H. V. Tran, Selection problems for a discounted degenerate viscous Hamilton-Jacobi equation, *Advances in Math.* 306, 684–703.
16. W. Jing, P. E. Souganidis, H. V. Tran, Large time average of reachable sets and Applications to Homogenization of interfaces moving with oscillatory spatio-temporal velocity, *DCDS-S*, Volume 11, Number 5, October 2018, 915–939.

15. A. Ciomaga, P. E. Souganidis, H. V. Tran, Stochastic homogenization of interfaces moving with changing sign velocity, *J. Differential Equations* 258 (2015), 1025–1057.
14. H. Mitake, H. V. Tran, Weakly coupled systems of the infinity Laplace equations, *Trans. Amer. Math. Soc.* 369 (3), 1773–1795.
13. L. C. Evans, O. Kneuss, H. V. Tran, Partial regularity for minimizers of singular energy functionals, with application to liquid crystal models, *Trans. Amer. Math. Soc.* (2016), no. 5, 3389–3413.
12. S. N. Armstrong, H. V. Tran, Y. Yu, Stochastic homogenization of a nonconvex Hamilton-Jacobi equation, *Calculus of Variations and PDE* (2015), no. 2, 1507–1524.
11. S. N. Armstrong, H. V. Tran, Stochastic homogenization of viscous Hamilton-Jacobi equations and applications, *Analysis and PDE* 7-8 (2014), 1969–2007.
10. S. N. Armstrong, H. V. Tran, Viscosity solutions of general viscous Hamilton-Jacobi equations, *Mathematische Annalen*, 361 (2015), no. 3, 647–687.
9. H. Mitake, H. V. Tran, Large-time behavior for obstacle problems for degenerate viscous Hamilton–Jacobi equations, *Calculus of Variations and PDE* (2015) no. 2, 2039–2058.
8. F. Cagnetti, D. Gomes, H. Mitake, H. V. Tran, A new method for large time behavior of degenerate viscous Hamilton–Jacobi equations with convex Hamiltonians, *Annales de l’Institut Henri Poincaré - Analyse non linéaire* 32 (2015), 183–200.
7. H. Mitake, H. V. Tran, A dynamical approach to the large-time behavior of solutions to weakly coupled systems of Hamilton–Jacobi equations, *J. Math. Pures Appl.* 101 (2014), 76–93.
6. H. Mitake, H. V. Tran, Homogenization of weakly coupled systems of Hamilton–Jacobi equations with fast switching rates, *Arch. Ration. Mech. Anal.* 211 (2014), no. 3, 733–769.
5. H. Mitake, H. V. Tran, Remarks on the large time behavior of viscosity solutions of quasi-monotone weakly coupled systems of Hamilton-Jacobi equations, *Asymptotic Analysis* 77 (2012), no 1-2, 43–70.
4. F. Cagnetti, D. Gomes, H. V. Tran, Convergence of a semi-discretization scheme for the Hamilton–Jacobi equation: A new approach with the adjoint method, *Applied Numerical Mathematics* 73 (2013), 2–15.
3. F. Cagnetti, D. Gomes, H. V. Tran, Adjoint methods for obstacle problems and weakly coupled systems of PDE, *ESAIM: Control, Optimisation and Calculus of Variations* 19 (2013), no. 3, 754–779.
2. F. Cagnetti, D. Gomes, H. V. Tran, Aubry-Mather measures in the non convex setting, *SIAM Journal on Mathematical Analysis* 43 (2011), 2601–2629.

1. H. V. Tran, Adjoint methods for static Hamilton-Jacobi equations, *Calculus of Variations and PDE* 41 (2011), no. 3-4, 301–319.

Undergraduate publications

2. D. M. Duc, T. V. Hung, N. T. Khai, Critical points of non- C^2 functionals, *Topol. Methods Nonlinear Anal.* 29 (2007), no. 1, 35–68.
1. D. M. Duc, T. V. Hung, N. T. Khai, Morse-Palais lemma for nonsmooth functionals on normed spaces, *Proc. Amer. Math. Soc.* 135 (2007), no. 3, 921–927.

Books/Lecture notes

2. H. V. Tran, Hamilton–Jacobi equations: theory and applications, AMS Graduate Studies in Mathematics, to appear.
1. N. Q. Le, H. Mitake, H.V. Tran, Dynamical and Geometric Aspects of Hamilton-Jacobi and Linearized Monge-Ampère Equations, Lecture Notes in Mathematics 2183, Springer.

Graduate students

- Yeon-Eung Kim (Ph.D. in May 2019).
- Son Thai Nguyen Tu.
- Yuxi Han.
- Jiwoong Jang.

Postdocs

- Xiaoqin Guo.
- Dohyun Kwon.

Editorial works

- Editor, Minimax Theory and its Applications.
- Editor of Lecture Notes in Mathematics 2183, Springer.
- Guest Editor of Discrete and Continuous Dynamical System - Series S, Volume 11, Number 5, October 2018.

Teaching

Invited topic courses

- Basics about Laplace equation and harmonic functions, Winter School on PDEs 2020, VIASM and Saigon University, Ho Chi Minh city, December 2020.
- Optimal control theory and Hamilton-Jacobi equations, DatAI@SG Math Webinar series: 5 lectures via Zoom, August-September 2020.
- A short course on “Level set method and mean curvature flow equation”, University of Sciences, Ho Chi Minh city, Vietnam, July 2018.
- Short course on “Some new methods in viscosity solutions”, University of Science, Ho Chi Minh city, Vietnam, July 2017.
- Short course on “Some fixed point results and applications to ODEs, PDEs”, UW-Madison Undergraduate PDE Summer School 2017, May 15–June 9, 2017.
- Short course on “Weak convergence methods for nonlinear PDEs”, University of Science, Ho Chi Minh city, Vietnam, July 2016.
- Short course on “periodic homogenization of Hamilton-Jacobi equations”, University of Science, Ho Chi Minh city, Vietnam, July 6-14, 2015.
- Short course on “Stochastic homogenization for first order Hamilton-Jacobi equations”, FMSP lectures, The University of Tokyo, September 8-12, 2014.
- Short course on “An introduction to viscosity solutions”, summer program on “PDEs and Applied Mathematics”, Vietnam Institute for Advanced Study in Mathematics, July 14-25, 2014.

Regular teaching

- 2019-2020: Math 521 (Analysis I), Math 821 (Topic course in PDEs), UW Madison.
- 2018-2019: Math 375-376, Math 819 (graduate PDE I), UW Madison.
- 2017-2018: Math 521 (Analysis I), Math 619 (undergraduate PDEs), UW Madison.
- 2016-2017: Math 821 (Topic course in PDEs), Math 211 (Calculus), Math 522 (Analysis II), UW Madison.
- 2015-2016: Math 319 (ODEs), Math 521 (Analysis I), UW Madison.
- 2014-2015: Math 161-163 (Honor Calculus–IBL style), The University of Chicago.
- 2013-2014: Math 161-163 (Honor Calculus–IBL style), The University of Chicago.
- 2012-2013: Math 200 (Math Methods for Physical Sciences), Math 204 (Analysis in \mathbb{R}^n –accelerated style), Math 270 (Basic Complex Variables), The University of Chicago.

Short visits

- Hokkaido university, August 1-10, 2016. Host: Professor Hideo Kubo.
- Hiroshima university and Tokyo university, September 1-14, 2014. Host: Professors Y. Giga, H. Mitake.
- Vietnam Institute for Advanced Study in Mathematics, July 14-25, 2014.
- Fukuoka university, Japan, June 2-June 13, 2013. Host: Professor H. Mitake.
- Oxford Centre for Nonlinear PDE, October, 2011 (1 month). Host: Professor John Ball.
- Department of Pure and Applied Math, Padova University, Sep 17-Oct 5, 2011.
- ICE-AMSI Summer School, University of Sydney, Sydney, Australia (fully funded by AMSI), 2007.

Some Invited talks

- PDE seminar, Purdue University, April 2021.
- Brown PDE Seminar, Brown University, April 2021.
- Pure Mathematics Colloquium, Texas Tech University, February 2021.
- Seminar, Da Lat University, Vietnam, December 2020.
- Colloquium, Loyola University Chicago, December 2020.
- Plenary talk, Annual Meeting of Vietnam Institute for Advanced Study in Mathematics (VIASM) 2020, November 2020.
- IPAM Workshop III: Mean Field Games and Applications, May 2020.
- Differential Equations Seminar, NCSU, March 25, 2020.
- Applied and Computational Mathematics Seminar, UW Madison, January 31, 2020.
- CNA seminar, Carnegie Mellon University, January 16, 2020.
- Fall Western AMS Sectional Meeting, Riverside, California, November 9-10, 2019.
- 84th Midwest PDE seminar, Illinois Institute of Technology, Chicago, IL, October 26-27, 2019.
- New trends in Hamilton-Jacobi: PDE, Control, Dynamical Systems and Geometry, Shanghai, July 1-5, 2019.

- Recent Progress in Nonlinear Partial Differential Equations, June 26-29 2019, Beihang University, Beijing, China.
- Southern California Analysis and PDE Conference: Reaction, Diffusion, and Homogenization, UC Irvine, June 1-2, 2019.
- Colloquium, Southern Methodist University, March 2019.
- Conference on Analysis and Applied Mathematics, Ho Chi Minh City University of Technology, January 2019.
- Analysis seminar, University of Texas Austin, October 2018.
- EPSRC Durham Symposium Homogenisation in Disordered Media, Durham University, UK, August 19-25, 2018.
- Weak KAM 2018 – Rio 2018 ICM Satellite Conference, Brazil, July 23-27, 2018.
- Special Session 107, AIMS meeting 2018, Taipei, Taiwan, July 2018.
- Analysis seminar, University of Science, Ho Chi Minh city, Vietnam, January 2018.
- CAM seminar, Tsinghua University, Beijing, China, December 2017.
- PDE seminar, Tsinghua University, Beijing, China, December 2017.
- Analysis seminar, UC San Diego, November 2017.
- Viscosity solution approach to asymptotic problems in front propagation, dynamical system and related topics, RIMS, Kyoto University, July 3-5, 2017.
- Colloquium, West Virginia University, April 2017.
- AMS sectional meeting, Indiana University, April 2017.
- Differential Equations seminar, NCSU, March 2017.
- Analysis and PDE seminar, UC Berkeley, March 2017.
- Colloquium, UTK, February 2017.
- Probability seminar, UW Madison, October 2016.
- The 41st Sapporo Symposium on Partial Differential Equations, Hokkaido university, August 2016.
- CAMP seminar, The University of Chicago, May 2016.
- PDE/Applied Math Seminar, Indiana university, April 2016.
- Minisymposium, SIAM Conference on Analysis of PDEs, December 2015.

- 76th Midwest PDE seminar, Michigan State University, November 21-22, 2015.
- Central Fall Sectional Meeting of the AMS, Loyola University Chicago, Chicago, IL October 2-4, 2015.
- PDE and GA seminar, UW Madison, September 2015.
- Developments in the theory of homogenization, Banff, July 26-31, 2015.
- 6th Symposium on Analysis and PDEs, Purdue university, June 2015.
- Analysis seminar, Northwestern, May 2015.
- PDE seminar, UCLA, April 2015.
- BU/Brown Dynamics and PDE Seminar, March 2015.
- Colloquium, Miami university, March 2015.
- University of Warwick, January 2015.
- Colloquium, University of Southern California, December 2014.
- Analysis seminar, University of Texas Austin, December 2014.
- Colloquium, University of Wisconsin Madison, November 2014.
- PDE seminar, Loyola University Chicago, October 2014.
- PDE seminar, UC Berkeley, September 2014.
- PDE seminar, Waseda university, September 2014.
- PDE seminar, Hiroshima university, September 2014.
- Plenary speaker, Summer meeting 2014, University of Science, Ho Chi Minh city, Vietnam.
- PDE seminar, UC Irvine, May 2014.
- PDE seminar, Purdue university, April 2014.
- International Workshop on PDEs and Related Topics in Nonlinear Problems, Hiroshima university, Japan, February 2014.
- Minisymposium, SIAM Conference on Analysis and PDEs, December 2013.
- Fall Southeastern Sectional Meeting of the AMS, University of Louisville, Kentucky, October 2013.
- 33rd Southeastern-Atlantic Regional Conference on Differential Equations, University of Tennessee at Knoxville, September 2013.

- PDE seminar, Fukuoka university, Japan, June 2013.
- PDE seminar, UC Irvine, April 2013.
- CAMP seminar, The University of Chicago, 2012.
- Analysis seminar, Loyola University Chicago, 2012.
- Minisymposium, SIAM Conference on Analysis and PDEs, December 2011.
- OxPDE, Oxford university, UK, October 2011.
- PDE seminar, Padova university, September 2011.
- INDAM workshop, Weak KAM theory in Italy, Cortona, September 11-17, 2011.

Synergistic Activities

- NSF panelist, 2020.
- Organizer, Madison Workshop in PDE 2020, May 18-21, 2020.
- Organizer, Summer Meeting 2020, University of Science, Ho Chi Minh city, Vietnam, July 2020.
- Organizer, Summer Meeting 2019, University of Science, Ho Chi Minh city, Vietnam, July 2019.
- Committee member of dissertation defenses: Tau Shean Lim (May 2017), Ruiwen Shu (April 2018), Jingrui Cheng (May 2018), Keith Dsouza (May 2018).
- Organizer, Summer Meeting 2018, University of Science, Ho Chi Minh city, Vietnam, July 2018.
- Organizer, Special session on Viscosity solutions: beyond the well-posedness theory, AIMS meeting 2018.
- Organizer, 81st Midwest PDE seminar, UW Madison, April 21-22, 2018.
- Organizer, Summer Meeting 2017, University of Science, Ho Chi Minh city, Vietnam, July 2017.
- Organizer, UW-Madison Undergraduate PDE Summer School, May 15-June 9, 2017.
- Organizer, Madison Workshop in Analysis and PDE, UW Madison, October 1-2, 2016.
- Organizer, Summer Meeting 2016, University of Science, Ho Chi Minh city, Vietnam, July 23-24, 2016.

- Organizer, special session on “Recent developments related to conservation laws and Hamilton-Jacobi equations”, AIMS 2016 Meeting, Orlando, Florida, USA, July 1-5, 2016.
- Organizer, Summer Meeting 2015, University of Science, Ho Chi Minh city, Vietnam, August 8-9, 2015.
- Organizer of the student PDE seminar, The University of Chicago, 2014-2015.
- Organizer of the summer program on “PDEs and Applied Mathematics”, Vietnam Institute for Advanced Study in Mathematics, July 14-25, 2014.
- Organizer of the one-day workshop, summer program on “PDEs and Applied Mathematics”, Vietnam Institute for Advanced Study in Mathematics, July 18, 2014.
- AWM Postdoc Panel, Department of Mathematics, University of Chicago, May 2014.
- Instructor for some summer math camps, Ho Chi Minh city, Vietnam, 2008-2010.
- Coordinator for the 48th International Mathematical Olympiad (IMO), Vietnam, 2007.
- Referee for various mathematics journals such as Annali SNS, Analysis and PDE, Applications and Applied Mathematics, Bulletin of Mathematical Sciences, Calculus of Variations and PDE, Communications in PDE, Communications on Pure and Applied Analysis, Communications on Pure and Applied Mathematics, Journal of Differential Equations, Nonlinearity, Nonlinear Analysis Series A: Theory, Methods & Applications, Proceedings AMS, SIAM Journal on Mathematical Analysis, Taiwanese Journal of Mathematics, etc.