Curriculum Vitae

Cheng Yu

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Education

- Ph.D. in Mathematics, Aug. 2013.
  University of Pittsburgh, Pittsburgh, PA.
  Advisor: Dehua Wang.

Employment

- University of Florida Aug.2024-
  Associate Professor
- University of Florida Aug. 2018 -Aug.2024
  Assistant Professor
- The University of Texas at Austin Aug. 2013 - July 2018
  Bing Instructor and lecturer
  Mentor: Alexis Vasseur

Research Interests

- Nonlinear partial differential equations.

Awards and Honors

- Collaboration Grants for Mathematicians, Simons Foundation, Sep. 20124- Aug. 2029.
- Collaboration Grants for Mathematicians, Simons Foundation, Sep. 2019 - Aug. 2024.
- The joint work with Alexis Vasseur has been the topic of a presentation at the Seminaire Bourbaki in IHP, Paris, June, 2017.
- Thomas C. Hales Distinguished Research Award in Mathematics 2013, University of Pittsburgh.
- AMS-Simons Grants 2013-2015.
- Andrew Mellon Pre-doctoral Fellowship Award, University of Pittsburgh, 2012-2013.

Editorial Board for Scientific Journal:

- Communications in Analysis and Mechanics

Publications

1. *Non-uniqueness for continuous solutions to 1D hyperbolic systems*, (with M. Chen, A. Vasseur), preprint, 2024, submitted.

2. *Deep learning techniques for identifying weak solutions to the Navier-Stokes equations*, (with D.X. Wang), preprint, 2023, submitted.

3. *Inviscid Limit of the Navier-Stokes-Korteweg Equations under the Weak Kolmogorov Hypothesis in* $\mathbb{R}^3$, (with D. Wang), Communications in Mathematical Analysis and Applications (CMAA), (to appear).

4. *Dissipative solutions to the compressible isentropic Navier-Stokes equations*, (with L. Guo, F. Li), Commun. Math. Sci. 21 (2023), no. 7, 1961–1987.

5. *Global existence of entropy-weak solutions to the compressible Navier-Stokes equations with nonlinear density dependent viscosities*, (with D. Bresch and A. Vasseur), J. Eur. Math. Soc. (JEMS) 24 (2022), no. 5, 1791–1837.

6. *Inviscid limit of the inhomogeneous incompressible Navier-Stokes equations under the weak Kolmogorov hypothesis in* $\mathbb{R}^3$, (with Dixi Wang and X. Zhao), Dyn. Partial Differ. Equ. 19 (2022), no. 3, 191–206.

7. *Global ill-posedness for a dense set of initial data to the isentropic system of gas dynamics*, (with M. R. Chen and A. Vasseur), Adv. Math, 393(2021), 108057.

8. *Global weak solutions to the compressible Navier-Stokes-Vlasov-Boltzmann equations* (with I. Gamba), J. Math. Fluid Mech. 22 (2020), no. 4, Art. 45, 22 pp.

9. *Onsager's energy conservation for inhomogeneous Euler equations*, (with R. M. Chen), J. Math. Pures Appl. (9) 131 (2019), 1–16.

10. *Global weak solution to the viscous two-phase model with finite energy*, (with A. Vasseur and H. Wen), J. Math. Pures Appl. (9) 125 (2019), 247–282.

11. *The global existence of weak solutions of the Navier-Stokes-Boltzmann equations* (with L. Yao), J. Differential Equations 265 (2018), no. 11, 5575-5603.

12. *Energy conservation for the weak solutions of the compressible Navier-Stokes equations,* Arch. Ration. Mech. Anal. 225 (2017), no. 3, 1073-1087.

13. *Existence of global weak solutions for 3D degenerate compressible Navier-Stokes equations* (with A. Vasseur), Invent. Math. 206 (2016), no. 3, 935-974.

14. *Global weak solutions to the compressible quantum Navier-Stokes equations with damping* (with A. Vasseur), SIAM J. Math. Anal. 48 (2016), no. 2, 1489-1511.

15. *Global weak solution for density-dependent Navier-Stokes-Vlasov equations* (with D. Wang), J. Differential Equations 259 (2015), no. 8, 3976-4008.

16. *Incompressible limit for the compressible flow of liquid crystals* (with D. Wang), J. Math. Fluid Mech. 16 (2014), no. 4, 771-786.

17. *Global weak solutions to a coupled compressible Navier-Stokes and Q-tensor system* (with D. Wang, X. Xu), Commun. Math. Sci. 13 (2015), no. 1, 49-82.

18. *Global weak solution for incompressible Navier-Stokes-Vlasov equations*, J. Math. Pures Appl. (9) 100 (2013), no. 2, 275-293.

19. *Global weak solution and large-time behavior for the compressible flow of liquid crystals* (with D. Wang), Arch. Ration. Mech. Anal. 204 (2012), no. 3, 881-915.

Short Term Visits

- Universität Mannheim, German, July 2022.
- University of Oxford, UK, June 2019.
- University College London, UK, June 2019.
- The University of Texas at Austin, April 2019.

Invited Talks at Seminars

- PDE seminar, Academy of Mathematics and Systems Science, the Chinese Academy of Sciences (CAS), July 2023.
- Analysis Seminar, Texas Tech University, May 2023.
- The Caltech-UCLA-USC joint analysis and PDE seminar, April 2023.
- ACM seminar, University of South Carolina, April 2023.
- PDE seminar, West Virginia University, Jan. 2022.
- PDE seminar, Shanghai Jiaotong University, Nov. 2021.
- Colloquium, New York University Abu Dhabi, October 2021.
- PDE seminar, The University of Tennessee at Knoxville, September 2021.
- Short research course, Beijing Normal University, June 2021.

- CMSA Interdisciplinary Science Seminar, Harvard University, April 2021.
- PDE seminar (two hours), University of Pittsburgh, January 2020.
- Analysis seminar, University of Alabama, October 2019.
- PDE seminar, Georgia Institute of Technology, September 2019.
- Multiscale Seminar, Illinois Institute of Technology, September 2019.
- PDE seminar, University of Oxford, June 2019.
- Analysis seminar, University of Texas at Austin, April 2019.
- PDE seminar, Brown University, March 2019.
- Analysis seminar, University of Pennsylvania, February 2019.
- PDE seminar,University of Pittsburgh, September 2018.
- PDE Seminar, University California, Davis, March 2018.
- Colloquium, University of Florida, February 2018.
- PDE seminar, KIT, Germany, February 2018.
- Colloquium, University of California, Riverside, February 2018.
- Colloquium, National University of Singapore, February 2018.
- PDE Seminar, Beijing University, August 2017.
- Colloquium, LSU, February 2017.
- PDE Seminar, Uconn, January 2017.
- UCLA and Caltech joint Analysis Seminar, UCLA, November 2016.
- Applied Analysis Seminar, Virginia Tech, October 2016.
- CNA Seminar/Colloquium, Carnegie Mellon University, September 2016.
- PDE Seminar, University of Pittsburgh, September 2016.
- Colloquia and Seminars, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, June 2015.
- PDE Seminar, University of Pittsburgh, May 2015.
- Colloquia and Seminars, Academy of Mathematics and Systems Science, Chinese Academy of Sciences, December 2014.
- PDE Seminar, the University of Texas at Austin, October 2013.

- PDE Seminar, University of California, Irvine, October 2012.
- PDE Seminar, University of California, Riverside, October 2012.
- PDE Seminar, Wuhan Institute of Physics and Mathematics, Chinese Academy of Sciences, July 2012.
- PDE Seminar, Zhejiang University, China, June 2012.

Invited Talks at Conferences

- *Workshop on hyperbolic conservation laws*, June 24-28, 2024, Seoul.
- *Stability and Multi-scale Analysis for PDEs*, May 13-15, 2024, University of Texas at Austin.
- *Recent Advances in Hyperbolic PDEs and Applications* April 6-7,2024, University of Pittsburgh.
- *International Conference on Hyperbolic Partial Differential Equations (HPDE 2023)*, Aug.3-5, 2023, Shanghai Jiaotong University, China.
- *Special section "Hyperbolic Partial Differential Equations and Applications"* in the 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, May 31 - June 4, 2023, Wilmington, NC USA.
- *Workshop on Nonlinear PDEs: Stability Analysis and Multiscale Applications*,University of Pittsburgh, 21-23 April 2023.
- *Oxford Workshop on Stability Analysis for Nonlinear PDEs*, Oxford University, UK, 15-19, August 2022.
- *Minisymposium "PDE-06 Analysis of compressible multiphase systems" at Equadiff 15, Brno, Czech Republic* 11-15, July 2022.
- *International Conference on Partial Differential Equations in Shanghai Jiaotong University*, July 2022.
- *Symposium on PDE 2022 in HongKong*, June 2022.
- *Pittsburgh PDE Workshop*, May 2021.
- *Workshop on PDEs in Fluid Dynamics,* Pittsburgh, November 3-5, 2017.
- *AMS Sectional meeting*, University of North Texas-Denton, September 2017.
- *the Mathematical Congress of the Americas*, Montreal, Canada, July 2017.
- *11th bi-annual Conference on dynamical systems, differential equations and applications*, Orlando, Florida, July 2016.

- *Young researchers workshop,* University of Maryland, College Park, November 2015.
- *AMS Sectional meeting*, California State University, October 2015.
- *AMS Sectional meeting*, University of Nevada, Las Vegas, April 2015.
- *Conference on PDEs and free boundary problems*, University of Pittsburgh, March 2015.
- *Young researchers workshop*, University of Maryland, College Park, October 2014.
- *AMS Sectional meeting*, University of Tennessee, Knoxville, March 2014.
- *The Fourth Ohio river analysis meeting*, University of Kentucky, March 2014.
- *2013 SIAM conference on analysis of PDEs*, Florida, December 2013.
- Contributed talk at *Summer school and workshop "recent advances in PDEs and fluids"*, Stanford University, August, 2013.

Mentoring

- Visiting Assistant Professor(Postdoc): Mengying Xiao (co-mentored with Sara Pollock).
- Graduate Students: Dixi Wang, Golomb Visiting Assistant Professor in Mathematics at Purdue University.

Teaching

University of Florida

- MAP6356, Partial Differential Equaions I, fall 2023.
- MAA4212,Real Analysis and Adv Calc II, Spring 2023.
- MAA4211, Real Analysis and Advanced Calculus 1, Fall 2022.
- MAP6357, Partial Differential Equaions II, Spring 2022.
- MAA4103/MAA5105, Intro Adv Calc II, Spring 2022.
- MAP6356 , Partial Differential Equaions I, Fall 2021.
- MAP4305/MAP 5304, Dif Equa Eg and Phy Sci, Spring 2021, Fall 2020.
- MAP7437, Seminar in Appl Math II, Spring 2020.
- MAP7436, Seminar in Applied Math I, Fall 2019.
- MAP6932, Seminar in PDEs, Spring 2019.

- MAP2302, Elementary Differential Equations, Fall 2018,Spring 2021.

University of Texas Austin

- M427K Advanced Calculus for application II, Fall 2017, Spring 2018.
- M325K: Discrete Mathematics, Fall 2016, Summer 2017, Fall 2017.
- M408K: Differential Calculus, Fall 2016.
- M341: Linear Algebra and Matrix Theory, Spring 2014, Spring 2016, Spring 2017, Spring 2018.
- M408D: Differential and Integral Calculus, Fall 2013, Fall 2014.
- M340L: Matrices and Matrix Calculations, Fall 2013, Spring 2015,Fall 2015, Fall 2017.

Service

- The departmental services at University of Florida: Steering Committee(2022-2023), Graduate Selection Committee(2018-now), VAP Search Committee(2018-2020), Colloquium, Conferences, Visitors, and Travel Committee(2019-now); PhD Examination PDE Committee (Chair,2021-now).
- Ph.D comittee member for the following students: Ying Li, Yi Gu, Weiqi Shen (Mechanical Engineering).
- The honors thesis comittee member: Pablo Farall(Mechanical Engineering).
- Journal Referees:
  Inventiones Mathematicae, Communications in Mathematical Physics, Archive for Rational Mechanics and Analysis, Communications in Partial Differential Equations, Calculus of Variations and Partial Differential Equations, Journal of Differential Equations, the Annales de l'Institut Henri Poincare (C) - Analyse non linéaire, J. Math. Pures Appl., SIAM Journal of Mathematical Analysis, ...
- Co-organized of the special session "On the many scales of mathematical analysis of fluid "at AMS Sectional Meeting, University of Texas, San Antonio, Sep.2024.
- Co-organized of the special session "Nonlinear PDEs in Fluid Dynamics"at AMS Sectional Meeting, University of Florida, Nov. 2019.
- Co-organized of the special session "Nonlinear PDEs in Fluid Mechanics"at 2017 SIAM Conference on Analysis of Partial Differential Equations.
- Co-organized of the special session "Nonlinear Conservation Laws and Applications"at AMS Sectional Meeting, University of Nevada, Las Vegas, NV, April 2015.