Curriculum Vitae — Geng Chen

Department of Mathematics,
University of Kansas,
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Education:

BS, Applied Mathematics, Ocean University of China, Jul., 2002.

MS, Applied Mathematics, Fudan University, Jul., 2005, Advisor: Daqian Li (Tatsien Li).

Ph.D, Mathematics, University of Massachusetts, Amherst, Sep., 2010, Advisor: Robin Young.

Employment Experience:

Associate Professor, University of Kansas, Aug. 2020 - now

Assistant Professor, University of Kansas, Aug. 2016 - Aug. 2020

Hale postdoc, Georgia Institute of Technology, Aug. 2013 - 2016.

Research associate, Pennsylvania State University, Sep. 2010 - Aug. 2013.

Research Interests:

I have broad interests on analysis, partial differential equations, fluid dynamics, mathematical physics and mathematical modeling. Currently, my research focuses on the following topics.

- Hyperbolic conservation laws, Compressible Euler and Navier-Stokes equations;
- Nonlinear wave equations;
- Optimal mass transport.
- Gas dynamics, Water waves, Nematic liquid crystals.

Grants and Honors:

- NSF DMS-2008504, Large solutions for systems of hyperbolic conservation laws and wave equations in one and multiple space dimensions, Solo PI, 2020-2023, $264,998.
- NSF DMS-1715012, System of hyperbolic conservation laws and nonlinear wave equations, Solo PI, 2017-2021, $145,000.
- Big XII fellowship, $2,500, 2019-2020, for two visits to University of Texas, Austin.
- New Faculty General Research Fund, $8,000, 2017-2019, University of Kansas.
- AMS Simons Travel Grant, $4,000, 2014–2016. Mentor: Alberto Bressan in Penn State University.
- Distinguish Thesis Award, University of Massachusetts, Amherst, 2011.

Publications

A: Submitted and preprints

40. Geng Chen, Shihui Zhu and Yannan Shen, Existence and regularity for global solutions including breaking waves from Camassa-Holm and Novikov equations to lambda-family equations, submitted, available at: 2111.01030.
39. Hong Cai, Geng Chen and Yannan Shen, A Finsler type Lipschitz optimal transport metric for a quasilinear wave equation, submitted, available at arXiv:2007.15201.

B: Published and to appear

38. Geng Chen, Sam G. Krupa and Alexis F. Vasseur, Uniqueness and weak-BV stability for 2x2 conservation laws, *Arch. Ration. Mech. Anal.*, 246 (2022), no. 1, 299–332.
37. Geng Chen, Majed Sofiani, Singularity formation for the general Poiseuille flow of nematic liquid crystals, to appear in Communications on Applied Mathematics and Computation. (by invitation)
36. Hong Cai, Geng Chen and Tian-Yi Wang, Singularity formation for radially symmetric expanding wave of Compressible Euler Equations, to appear in *SIAM J. Math. Anal.*.
35. Hong Cai, Geng Chen, Yi Du and Yannan Shen, Uniqueness of conservative solutions to a one-dimensional general quasilinear wave equation through variational principle, *J. Math. Phys.*, 63 (2022), no. 2, Paper No. 021508, 21 pp.
34. Geng Chen, Gui-Qiang Chen and Shengguo Zhu, Vanishing Viscosity Limit of the Three-Dimensional Barotropic Compressible Navier-Stokes Equations with Degenerate Viscosities and Far-Field Vacuum, *Ann. Inst. H. Poincare C Anal. Non Lineaire*, 39 (2022), no. 1, 121-170.
33. Geng Chen, Gui-Qiang Chen and Shengguo Zhu, Formation of singularities and existence of global continuous solution for the compressible Euler equations, *SIAM J. Math. Anal.*, 53 (2021) volume 6, 6280–6325.
32. Hong Cai, Geng Chen and Hongwei Mei, Uniqueness of Dissipative Solution for Camassa-Holm Equation with Peakon-Antipeakon Initial Data, *Applied Mathematics Letters*, Volume 120, 2021, 107268.
31. Geng Chen, Tao Huang, and Weishi Liu, Poiseuille flow of nematic liquid crystals via the full Ericksen-Leslie model, *Arch. Ration. Mech. Anal.*, 236 (2020), 839-891.
30. Geng Chen, Optimal time-dependent density lower bound for nonisentropic gas dynamics, *J. Differential Equations*, 268 (2020), no. 7, 4017-4028.
29. Geng Chen, Ronghua Pan, and Shengguo Zhu, Lower bound of density for Lipschitz continuous solutions in the isentropic gas dynamic, *Discrete Contin. Dyn. Syst., Series A*, 39 (2019), no. 7, 4259-4277.
28. Yi Du, Geng Chen, Jianli Liu, The almost global existence for a 3-D wave equation of nematic liquid-crystals, 53–64, Contemp. Math., 725, Amer. Math. Soc., Providence, RI, 2019. (conference proceeding by invitation).
27. Alberto Bressan, Geng Chen, Qingtian Zhang, On finite time BV blow-up for the p-system, *Comm. Partial Differential Equations.* 43 (2018), no. 8, 1242–1280.
26. Geng Chen, Robin Ming Chen and Yue liu, On the global well-posedness of conservative weak solutions for the integrable Novikov equation, *Indiana Univ. Math. J.*, 67 (2018), 2393-2433.
25. Hong Cai, Geng Chen, Robin Ming Chen and Yannan Shen, Lipschitz metric for the Novikov equation, Arch. Ration. Mech. Anal. 229 (2018), no. 3, 1091-1137.
24. Hong Cai. Geng Chen, Yi Du, Uniqueness and regularity of conservative solution to a wave system modeling nematic liquid crystal, J. Math. Pures Appl. (9) 117 (2018), 185-220..

23. Hong Cai, Geng Chen, Yannan Shen and Zhong Tan, Generic regularity and Lipschitz metric for the Hunter-Saxton type equations, *J. Differential Equations*, 262 (2017), 1023-1063.
22. Hong Cai, Geng Chen and Yannan Shen, Lipschitz Metric for conservative solutions of the two–component Camassa–Holm system, *Z. Angew. Math. Phys. (ZAMP)*, 68 (2017), no. 1, 12 pp.
21. Alberto Bressan and Geng Chen, Lipschitz metric for a class of nonlinear wave equations, *Arch. Ration. Mech. Anal.*, 226 (2017), no. 3, 1303-1343.
20. Geng Chen, Ronghua Pan and Shengguo Zhu, Singularity formation for compressible Euler equations, *SIAM J. Math. Anal.*, 49 (2017), no. 4, 2591-2614.
19. Alberto Bressan and Geng Chen, Generic structure of conservative solutions to a nonlinear wave equation, *Ann. Inst. H. Poincare Anal. Non Lineaire*, 34 (2017), no. 2, 335-354.
18. Geng Chen, Optimal time-dependent lower bound on density for classical solutions of 1-D compressible Euler equations, *Indiana Univ. Math. J.*, 66 (2017), no. 3, 725-740.
17. Alberto Bressan, Geng Chen, Qingtian Zhang and Shengguo Zhu, No BV bounds for approximate solutions to the p-system with general pressure law, *J. Hyper. Differential Equations*, 12 (2015), 799-816.
16. Alberto Bressan, Geng Chen and Qingtian Zhang, Unique Conservative Solutions to a Variational Wave Equation, *Arch. Ration. Mech. Anal.*, 217 (2015), no. 3, 1069-1101.
15. Geng Chen, Tao Huang and Chun Liu, Finite time singularities for hyperbolic systems, *SIAM J. Math. Anal.*, 47 (2015), no. 1, 758-785.
14. Geng Chen and Yannan Shen, Existence and regularity of solutions for nonlinear wave equations, *Discrete Contin. Dyn. Syst., Series A*, 35 (2015), no. 8, 3327-3342.
13. Geng Chen and Robin Young, Shock-free solutions of the compressible Euler equation, *Arch. Ration. Mech. Anal.*, 217 (2015), no. 3, 1265-1293.
12. Alberto Bressan, Geng Chen and Qingtian Zhang, Lack of BV bounds for approximate solutions to the p-system with Large Data, *J. Differential Equations* 256 (2014), 3067-3085.
11. Alberto Bressan, Geng Chen and Qingtian Zhang, Uniqueness of conservative solutions to the Camassa-Holm Equation via characteristics, *Discrete Contin. Dyn. Syst., Series A*, 35 (2015), no. 1, 25-42.
10. Geng Chen and Helge Kristian Jenssen, No TVD fields for 1-D isentropic gas flow, *Comm. Partial Differential Equations* 38 (2013), no. 4, 629-657.
9. Geng Chen and Yuxi Zheng, Singularity and existence for a wave system of nematic liquid crystals, *J. Math. Anal. Appl.*, 398 (2013), 170-188.
8. Geng Chen, Robin Young and Qingtian Zhang, Shock formation in the compressible Euler equations and related systems, *J. Hyper. Differential Equations*, 10 (2013), no. 1, 149-172.
7. Geng Chen, Ping Zhang and Yuxi Zheng, Energy conservative solutions to a nonlinear wave system of nematic liquid crystals, *Comm. Pure Appl. Anal.*,, 12 (2013), no. 3, 1445-1468.
6. Geng Chen, Erik Endres and Helge Kristian Jenssen, Pairwise wave interactions in ideal polytropic gases, *Arch. Ration. Mech. Anal.*, 204 (2012), no. 3, 787-836.
5. Geng Chen and Robin Young, The vacuum in nonisentropic gas dynamics, *Acta Math. Sci. Ser. B Engl. Ed.*, 32 (2012), no. 1, 339-351. (invited paper for a special issue for Professor Constantine M. Dafermos' 70's birthday)

4. Geng Chen and Robin Young, Smooth solutions and singularity formation for the inhomogeneous nonlinear wave equation., *J. Differential Equations*, 252 (2012), no. 3, 2580-2595.
3. Geng Chen, Formation of singularity and smooth wave propagation for the non-isentropic compressible Euler equations, *J. Hyper. Differential Equations*, 8 (2011), no. 4, 671-690.
2. Geng Chen, Disease persistence for a kind of age-structured epidemic models, *Appl. Math. J. Chinese Univ. Ser. A*, 22 (2007), no. 3, 253-262.
1. Geng Chen and Yuanjun Wang, SARS epidemic model and its application, *Appl. Math. J. Chinese Univ. Ser. A*, 21 (2006), no. 3, 253-263.

Recent Scholarly Presentations (Recent 5 years after 2018)

- Dec 2, 2022, Colloquium, University of Alabama, Birmingham,
- Nov 4-6, 2022, 5th Annual Meeting of the SIAM Texas-Louisiana Section, Houston,
- Oct 14, 2022, Applied Mathematics and Computation Seminar, University of Massachusetts, Amherst.
- Sep 29, 2022, CAM colloquium, Penn State,
- Mar 30-Apr 1, 2022, 12th Annual IMACS conference, University of Georgia.
- Mar 26-28, 2022, AMS sectional meeting, Purdue University,
- Dec 8, 2021, CAM seminar, KU
- Nov 2021, PDE seminar, Shanghai University, China
- Jun, 2021, PDE seminar, Huazhong University of Science and Technology, China
- Nov 11, 2020, Nonlinear Analysis/Differential Equations seminar, North Carolina State University,
- Sep 23, 2020, PDE seminar, Shanghai University, Shanghai, China,
- Jul 09, 2020, PDE seminar, Minzu University of China, Beijing, China,
- Feb 7, 2020, PDE Seminar, Vanderbilt University,
- Feb 5 2020, CAM Seminar, KU,
- Dec 11, 2019, SIAM Conference on Analysis of Partial Differential Equations (PD19),
- Nov 2, 2019, AMS special session, Gainesville, FL.,
- Sep. 25, 2019, University of Texas, Austin,
- Sep. 23, 2019, Mathematics Colloquium, Wayne State University,
- Aug 23, 2019, special session, International Conference on Applied Mathematics, Modeling and Computational Science (AMMCS),
- May 10, 2019, PDE seminar, University of California, Los Angeles.
- May 6, 2019, PDE Forum Modeling and Analysis (workshop), University of Pittsburgh
- March 29, 2019, PDE seminar, University of South Carolina.
- Oct 7, 2018, SIAM Louisiana-Texas Section Conference, Baton Rouge, Louisiana, special section: Nonlinear conservation laws and applications.
- Aug 2-3, 2018, Mini-workshop, Jinan University, Guangzhou, China.
- Jul 11, 2018, Colloquium, Fudan University, Shanghai, China.
- June 25, 2018, XVII International Conference on Hyperbolic Problems Theory, Numerics, Applications, Penn State University,
- Jun 13, 2018, SIAM Conference on Nonlinear Waves and Coherent Structures, minisymposium: Boundaries, Fronts, and Interfaces in Biological and Physical Applications.

- Mar 16, 2018, PDE seminar, Tulane University, LA.
- Feb 22, 2018, PDE Seminar, University of Missouri, MO.

Major Committees:

- Director of Graduate Admission, 2020-Present.
- Organizing Sneek Peak Event, Nov. 2020 (20+ participants) and Nov 2021 (20+ participants), Nov 2022.
- Organizer for a section, Diversifying STEM workshop, Oct 2022.
- Co-Organizer, Mathematics Distinguished Lecture Series, (For Constantine Dafermos), 2017-2018.

Organization of conference:

- Co-organizer on Workshop on Nonlinear Differential Equations, Dynamical Systems and Applications, Oct 20-21, 2018 (with Weishi Liu).

Organization of Special section or Minisymposium for Conferences:

- Special Session on "System of Hyperbolic Conservation Laws and Applications." at IMACS, at University of Georgia, Mar 30-Apr 1, 2022 (with Yanni Zeng).
- Special session on "Conservation laws and nonlinear wave equations" at the AMS Fall Eastern Sectional Meeting, virtual conference formerly to be held at Pennsylvania State University, State College, PA, October 3-4, 2020 (Saturday - Sunday) Meeting #1160 (with Alberto Bressan and Qingtian Zhang).
- Special session at the AMS Sectional meeting (March 2020, Tufts University). (with Siran Li and Kun Zhao) Canceled due to Covid.
- SIAM conference (PD19) co-organizer of Minisymposium on Nonlocal PDEs in Fluid Dynamics, La Quinta, CA, Dec 11-14, 2019 (with Changhui Tan).
- Special Session, conference on Applied Mathematics, Modeling and Computational Science (AMMCS-2019), Waterloo, Canada, August 18-23, 2019. (with Alberto Bressan)
- SIAM conference (PD19) co-organizer of Minisymposium on Nonlocal PDEs in Fluid Dynamics, La Quinta, CA, Dec 11-14, 2019 (with Changhui Tan)
- SIAM conference (PD17), co-organizer of Minisymposium on Nonlinear PDEs in Fluid Mechanics, Baltimore, MD, Dec. 9-12, 2017 (with Cheng Yu and Xiaoqian Xu).
- Joint Mathematics Meetings, co-organizer of Special Session on *PDE Analysis on Fluid Flows*, Atlanta, GA, Jan. 4-7, 2017. (with Ronghua Pan and Xiang Xu)
- AMS Fall Western Sectional meeting, co-organizer of Special Session on Conservation Laws, Nonlinear Waves and Applications, University of California, Riverside, Riverside, CA Nov. 4-5, 2017 (with Tien Khai Nguyen and Qingtian Zhang).
- AMS Spring Southeastern Sectional meeting, co-organizer of special session on *PDE Analysis in Fluid Flows*, University of Georgia, Athens, GA, March 5-6, 2016. (with Ronghua Pan and Yao Yao)
- AMS Spring Southeastern Section Meeting, co-organizer of special session on *Recent Development on Hyperbolic Conservation Laws*, University of Tennessee, Knoxville, TN, March 21–23, 2014. (with Ronghua Pan and Weizhe Zhang)

Editor on a conference proceeding:

- The AMS Contemporary Mathematics book series is publishing a volume based on two special sessions "Spectral Calculus and Quasilinear Partial Differential Equations" and "PDE Analysis on Fluid Flows" held at the joint meetings at Atlanta, January 4-7. The serving editors are Marius Beceanu, Jerry Bona, Avy Soffer, Shijun Zheng, Geng Chen and Tuoc V. Phan.

Referee on Peer-reviewed journals: More than 10 papers every year. Here is a selected list of journals: Inventiones, Memoirs of the AMS, Journal of Differential Equations, SIAM Journal of Mathematical Analysis, Communications in Mathematical Sciences, Nonlinear Analysis: Real World Application, Discrete and Continuous Dynamical Systems, etc.

Graduate and Postdoc Advising:

- Adviser: Doctoral
  Xiang Xu, Ph.D student. advisor.
  Majed Sofiani, Ph.D student. Co-adviser (with Weishi Liu).
- Adviser: Master,
  Lucas Schauer, graduated, Spring 2019. Lucas is now a Ph.D student in Colorado School of Mines.

Classroom teaching

- University of Kansas
  Spring 2022, Math 951, PDE II.
  Fall 2021, Math 810, Measure Theorem.
  Fall 2020, Math 220, Differential Equations.
  Spring 2020, Math 220, Differential Equations.
  Fall 2019, Math 646, Complex analysis, Math 810, Real Analysis.
  Spring 2019, Math 766, Analysis II (graduate course).
  Fall 2018, Math 850, Differential equations and dynamic systems (graduate course).
  Spring 2018, Math 951, Advanced PDE II (graduate course); Math 220, Differential Equations.
  Fall 2017, Reading course for Ph.D student.
  Spring 2017, Math 647, Applied Partial Differential equations, Math 291, Honor Linear Algebra.
  Fall 2016, Math 220, Differential Equation.