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;
- Gas dynamics, Water waves, Nematic liquid crystals.
- Nonlinear wave equations;
- Optimal mass transport.

Grants and Honors:

External grants

- NSF DMS-2306258, Stability, Uniqueness, and Existence for Solutions of Hyperbolic Conservation Laws and Nonlinear Wave Equations, Solo PI, 2023-2026, $234,974.
- NSF DMS-2008504, Large solutions for systems of hyperbolic conservation laws and wave equations in one and multiple space dimensions, Solo PI, 2020-2024, $264,998.
- NSF DMS-1715012, System of hyperbolic conservation laws and nonlinear wave equations, Solo PI, 2017-2021, $145,000.
- Simons Collaboration Grants for Mathematicians, 2017-2022, $40,000, recommended for grant, but withdrawn due to conflict with NSF grant.
- AMS Simons Travel Grant, $4,000, 2014–2016. Mentor: Alberto Bressan in Penn State University.

Internal grant

- 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.

Publications

A: Submitted and preprints

46. Geng Chen and Yanni Zeng, BV solutions to a hyperbolic system of balance laws with logistic growth, submitted, available at arXiv.
45. Albeto Bressan, Geng Chen, Shoujun Huang, Generic Singularities for 2D Pressureless Flow, submitted, available at arXiv:2307.11602.
44. Geng Chen, Yanbo Hu and Qingtian Zhang, Initial-boundary value problems for Poiseuille flow of nematic liquid crystal via full Ericksen-Leslie model, submitted, available at arXiv:2305.15046.
43. Geng Chen, Tao Huang, Xiang Xu, Singularity formation for full Ericksen-Leslie system of nematic liquid crystal flows in dimension two, submitted, available at arXiv:2305.03904.
42. Hong Cai, Geng Chen and Yannan Shen, A Finsler type Lipschitz optimal transport metric for a wave system modeling nematic liquid crystals, submitted, available at arXiv:2304.11535.

B: Published and to appear

41. Geng Chen, Weishi Liu and Majed Sofiani, The Poiseuille flow of the full Ericksen-Leslie model for nematic liquid crystals: The general Case, to appear in J. of Differential Equations.
40. Hong Cai, Geng Chen and Yannan Shen, A Finsler type Lipschitz optimal transport metric for a quasilinear wave equation, *J. Differential Equations* 356 (2023), 289–335.
39. 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, to appear in, Quarterly of Applied Mathematics.
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, *Commun. Appl. Math. Comput.* 5 (2023), no. 3, 1130–1147. (by invitation)
36. Hong Cai, Geng Chen and Tian-Yi Wang, Singularity formation for radially symmetric expanding wave of Compressible Euler Equations, *SIAM J. Math. Anal.*, 55 (2023), no. 4, 2917–2947.
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.

Presentation in the last three years

- Aug 15, 2023, ICIAM, Canada.
- July 26, 2023, Invited speaker, Recent Progress on Mathematical Fluid Dynamics, Jeju Island, Korea.
- Jun 30, 2023, Invited speaker, Shocking Developments: New Directions in Compressible and Incompressible Flows, Max Planck Institute for Mathematics in the Sciences, Leipzig,
- Nov 4-6, 2022, 5th Annual Meeting of the SIAM Texas-Louisiana Section, Houston,
- Oct 5, 2022, Analysis Seminar, University of Texas, Austin.
- Sep 14, 2022, Applied Mathematics and Computation Seminar, University of Massachusetts, Amherst.
- Aug 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

Major Committees in the Department of Mathematics:

- Director of Graduate Admission, 2020-Present.
- Executive committee, 2023 spring-2024
- Member of Graduate committee, 2020-Present.
- Member of Chair Search committee, 2021-Present.

Organization of Colloquium and workshop:

- Mathematics Distinguished Lecture Series, Constantine Dafermos, Brown University, April, 2018.
- 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 (recent 5 years):

- 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)

Graduate Advising:

- Adviser: Doctoral

  Xiang Xu, 5-th year Ph.D student. advisor. One paper ready for submission.

  Majed Sofiani, 6-th year Ph.D student. Co-adviser (with Weishi Liu). One paper published. One single author paper, and another paper are ready for submission.

  Faris El-Katri,1-st year Ph.D student. advisor.
- Adviser: Master,

  Lucas Schauer, graduated, Spring 2019. Lucas is now a Ph.D student in Colorado School of Mines.