

HAILIANG LIU  
CURRICULUM VITAE

[October 2021]

**CONTACT INFORMATION**

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Office: Department of Mathematics, Carver 434  
Iowa State University  
Ames, IA 50011-2064, USA  
Phone: (515)294-0392  
Email: hliu@iastate.edu  
URL: <https://faculty.sites.iastate.edu/hliu>

**RESEARCH AREAS**

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Applied Analysis of Partial Differential Equations  
Numerical Algorithms and Analysis, Scientific Computing  
Mathematical Deep Learning

**EDUCATION**

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1995 **Ph.D. Applied Mathematics**, Chinese Academy of Sciences  
1988 **M.Sc. Applied Mathematics**, Tsinghua University, China  
1984 **B.Sc. Mathematics**, Henan Normal University, China

**HONORS AND AWARDS**

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2019 The LAS Award for Outstanding Achievement in Research  
2019 Alexander von Humboldt Fellow  
2014 The Vinograd Award for Excellence in Advising of Graduate Students in Math  
2012 Fu-Rong Scholar, Hunan Province, China  
2009-2012 Dio Lewis Holl Chair in Applied Mathematics, Iowa State University  
2009 ISU Award for Mid-Career Achievement in Research  
2002-2008 Dio Lewis Holl Chair in Applied mathematics (inaugural), Iowa State University  
2002 The Robert Sorgenfrey Distinguished Teaching Award, UCLA  
1996 Alexander von Humboldt Research Fellowship  
1994 Excellent University Teacher's Award by Chinese Education Commission

**ACADEMIC POSITIONS**

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2020– **Professor of Computer Science**(by courtesy), Iowa State University  
2007– **Professor of Mathematics**, Iowa State University  
2002–2012 **Dio Lewis Holl Chair in Applied Mathematics**, Iowa State University  
2005– **Research Associate**, Ames Laboratory, Department of Energy  
2002–2006 **Associate Professor**, Iowa State University  
1999–2002 **CAM Assistant Professor**, UCLA  
1997–1998 **Alexander von Humboldt Research Fellowship**, Otto-von-Guericke University  
1996–1999 **Professor** at and on leave from Henan Normal University  
1995–1996, **Research Fellow**, City University of Hong Kong

1989–1995 **Associate Professor**, Henan Normal University  
1984–1986 **Instructor**, Henan Normal University.

## RESEARCH GRANTS

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### Collaborative Grants as Co-PI

2021–2024 **Core Co-PI** The ISU Presidential Interdisciplinary Research Initiative (PIRI) for establishing a new university center: “Translational AI Center for Research and Education” (\$ 450,000)

2020–2022 ISU Award for Faculty Learning Community on “Mathematics and Deep Learning”

2012–2017 **Node-PI**, NSF KI-Net: “Kinetic Description of Emerging Challenges in Multi-scale Problems of Natural Sciences. An NSF Research Network in Mathematical Sciences, \$5M

KI-Net Director: Eitan Tadmor; Centered around three hubs with PIs: I. Gamba (UT-Austin), S. Jin (UW-Madison), and E. Tadmor (UMD); Iowa State University is a key node out of 16 US nodes and 5 International nodes; see <https://www.ki-net.umd.edu/content/ki-net-hubs-and-nodes>

2011–2013 **Lead PI**, The American Institute of Mathematics (AIM) SQuaREs, a collaborative research program with core participants J. Ralton (UCLA) and O. Runborg (KTH)

2018–2011 **Co-PI**, NSF, FRG (Focused Research Group) Collaborative Research: “Kinetic Description of Multi-scale Phenomena: Modeling, Theory and Computation” (\$1M)

PI: **E. Tadmor** (Maryland), Co-PIs: P. Degond (Toulouse), I. Gamba (Austin), Yan Guo (Brown), S. Jin (Madison), **H. Liu (ISU)**, C. Ringhofer (Arizona State), T. Tzavaras (Maryland)

2006–2008 **Co-PI**, DOE, Multi-scale Mathematics; Co-PIs: **M. Gordon, J. Evans**

This effort aimed to reestablish the Applied Math Program in DOE’s Ames Laboratory

2003–2005 **Co-PI**, PSI (Plant Sciences Institute) Grant for “System Biology: Genome, Genetic Network, and Evolution” (with Xun Gu (GDCB))

2001–2004 **Co-PI**, NSF Grant DMS01-07917 for “Critical Threshold Phenomena in Nonlinear Balance Laws” (with Eitan Tadmor)

1999–2002 **Co-PI**, German Research Society (DFG) Grant Wa633/11-1 for “Stability of Hyperbolic Relaxation Problems” (with Gerald Warnecke)

### Individual Grants as Sole PI

2021–2022 **PI**, NSF Grant DMS 2135470 in Applied Mathematics, “Critical regularity, selection dynamics, and condensation in nonlinear balance laws” (supplemental \$ 70,000)

2018–2021 **PI**, NSF Grant DMS 1812666 in Applied Mathematics, “Critical regularity, selection dynamics, and condensation in nonlinear balance laws” (\$ 244,999)

2018–2023 **PI**, Simons Foundation Collaboration Travel Grant (awarded)

2013–2017 **PI**, NSF Grant DMS 1312636 in Applied Mathematics, “Recovery of high frequency wave fields, kinetic theory of photons and entropy methods” (\$225,185)

2009–2013 **PI**, NSF Grant DMS 09-07963, Applied Math program, “Geometrically based kinetic approach to multi-scale problems”, \$170,000.00

2009–2010 **PI**, IMA conference funds award for hosting the workshop “Midwest Numerical Analysis Day” (\$ 5000)

2005–2008 **PI**, NSF Grant DMS05-05975 in Applied Mathematics, “Multi-scale Wave Dynamics in Nonlinear Balance Laws”

2006–2007 **PI**, IMA Conference Fund Award (\$ 5000)

2005–2006 **PI**, New Collaborative Research Grant, DOE’s Ames Lab, “High Frequency Wave Prop-

agation and Geometric Motion” (\$20,000)

2002 AMS Travel Award for International Conference of Mathematicians in Beijing

1996–1998 **PI**, CNSF Grant, “Stability and Structure of Nonlinear Waves”

1994–1996 **PI**, Henan National Science Foundation Grant, “Study on the Distribution of Under-ground water in Central China”

## PROFESSIONAL SOCIETIES

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American Mathematical Society (AMS)

Society for Industrial and Applied Mathematics (SIAM)

Sigma Xi

## EDITORIAL BOARDS

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2020– Guest Editor

(1) Commun. Pure and Appl. Anal. (CPAA), Special issue on “Mathematics and Covid-19”

(2) J. Comput. and Appl. Math. (JCAM). Special issue for 2019 SIAM Sectional Conference

2008– Associate Editor, Journal of Mathematical Analysis and Application

2014–2018 Managing Editor, Advances in Applied Mathematics and Mechanics

2012–2015 Associate Editor, Journal of Applied Mathematics and Computing

## EXTERNAL PANELS AND REVIEWERS

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- NSF (US National Science Foundation) Panels of evaluation of research proposals in the area of Applied Mathematics (2019, 2020)
- Reviewer for RGC (Research Grants Council) of Hong Kong, evaluation of research proposals in the area of Applied Mathematics (regularly since 2010)
- Reviewer for ERC (European Research Council), evaluation of research proposals in the area of Computational Mathematics
- Reviewers/referees for many leading applied math journals, about 20 papers/year; with Journals including Math Comp., SIAM Journal on Numerical Analysis, SIAM Journal on Math. Anal., Journal of Computational Physics, Mathematical Methods in the Applied Sciences, Journal Differential Equation, Physics D. Nonlinear Phenomena, Communications in Computational Physics, and more.

## UNIVERSITY SERVICES

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2020– **Leadership team**, “Translational AI Center for Research and Education”

a new university center (July 1, 2021–) through the Presidential Interdisciplinary Research Initiative (PIRI) project at ISU

2020– CFSA (Chinese Faculty and Staff Association) Advisory Committee

2020–2022 **Convener**, ISU Faculty Learning Community Program on

“Mathematics and Deep Learning Collective” to promote Deep Learning research on ISU campus

2017–2018 **Initiator**, ‘2+1’ joint program with Beijing Normal University based on a signed agreement

2017–2018 LAS College Honors and Awards Committee

2015– Research Affiliation, the CFD (Computational Fluid Dynamics) Center at ISU; The center

has turned into the Center for Multiphase Flow Research and Education (MoFRE) since 2014.  
2005– Research Affiliation, DOE’s Ames Laboratory

## **EDUCATION AND OTHER ACTIVITIES**

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Over years, Liu has led organized efforts through rich activities: maintaining a series of weekly seminars, weekly working groups, the organization of conferences, workshops, and summer schools, networking with other research institutions in the US and abroad. The main seminars activities include:

- 2021– (Lead organizer) TrAC AI Seminar Series  
(38 faculty members across ISU campus)
- 2020-2022 (Convener/Organizer) Mathematics and Deep Learning Collective  
(52 participants across ISU campus)
- 2010–2018 (Coordinator) Computational and Applied Mathematics (CAM) Seminar  
(for students and faculty in Applied Math)
- 2004– Director, FRI (Focused Research Interaction) Seminar  
(for students and post-docs)
- 2003– 2008 Coordinator, Computational and Applied Math (CAM) Seminar  
(for students and faculty in Applied Math)

## **DEPARTMENTAL SERVICES**

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- Faculty promotion to Professor Committee (Chair, 2021)
- Departmental Chair Search Committee (2019, 2021)
- The Numerical Qualifier Committee (2019 –2021)
- Faculty Promotion to Tenure Committee (2020-)
- Tenure Track Review Committee (2019-2020)
- Tenured Faculty Review Committee (2019-2020)
- The Departmental Awards Committee (2019-2020)
- The Numerical Qualifier Committee (Chair, 2019-2020)
- Sabbatical Leave from ISU (2018-2019).
- Data Science Faculty Search Committee (Fall 2017– Spring 2018)
- Faculty Promotion to Tenure Committee ( Spring 2017 – Fall 2017)
- The Numerical Qualifier Committee (Fall 2017- Spring 2018)
- The Departmental Awards Committee (2016-2017)
- Tenure Track Faculty Review Committee (2015)
- Applied Math. Qualifier Committee (2015)
- Applied Math Graduate Admission Committee (Fall 2015 – Spring 2016)
- Departmental Faculty Search Committee (Fall 2014–Spring 2015)
- Faculty Promotion to Tenure Committee ( Spring 2013 – Fall 2013)
- Applied Math Graduate Admission Committee (Fall 2012 – Spring 2013)
- Faculty Promotion to Tenure Committee ( Spring 2012 – Fall 2012)
- Computational Math Faculty Search Committee (Chair, Fall 2011– Spring 2012)
- Tenure Track Faculty Review Committee (Chair) (Spring 2010)
- Departmental Graduate Committee (Spring 2010)
- The Numerical Qualifier Committee (Spring 2010 – Spring2011, Fall 2011 – Spring 2012)
- Departmental Advisory Committee, Fall 2009 – Spring 2011

Departmental Strategic Planning Committee, Fall 2009–Spring 2010.  
Departmental Faculty Search Committee, Fall 2009.  
The Numerical Qualifier Committee (Fall 2003–Fall2004, Spring 2005–Spring 2008(Chair))  
Departmental Advisory Committee, (Fall 2003–Fall 2004, Fall 2007–Spring2008).  
Faculty Search Committee (2003, Member); (2005-2006, Chair).  
Departmental Graduate Committee (Fall 2003–Fall 2004)  
Departmental Web-page Reconstruction Committee (Fall 2003–Spring 2004)

## GRADUATE STUDENTS

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2021–present **Jiahao He**, Ph.D. co-major in Agr Eng.  
2020–present **Tianxiang Gao**, Ph.D. co-major in CS.  
2019–present **Xuping Tian**, to graduate with Ph.D. 2024  
2016–present **Manas Bhatnagar**, to graduate with Ph.D. 2022  
Ph.D. 2020 **Wumaier Maimaitiyiming**, Post-doc at UCLA  
Ph.D. 2019 **Peimeng Yin**, Assistant Professor, University of Kansas.  
Ph.D. 2018 **Yi Jiang**, Assistant Professor, Southern Illinois University Edwardsville  
Ph.D. 2015 **Wenli Cai**, co-supervised with Ning SU (Tsinghua University);  
Associate Professor, China University of Mining and Technology, Beijing  
Ph.D. 2014 **Wenyong Lu**, co-supervised with Yunqing Huang (Xiangtan University)  
Associate Professor, Hunan University of Science and Technology  
Ph.D. 2014 **Yongki Lee**, Tenure-track Assistant Professor at Georgia Southern University  
Ph.D. 2014 **Nattapol Ploymaklam**, Associate Professor, Chiang Mai University, Tailand  
Ph.D. 2013 **Maksym Pryporov**, Engineer at OXY (Occidental Petroleum) inc.  
Ph.D. 2013 **Hui Yu**, Tenure-track Assistant Professor, Tsinghua University  
Ph.D. 2008 **Xiaoliang Xie**, CTO, CalmCar Vehicle Vision System Inc. Tianjin  
Ph.D. 2008 **Zhongming Wang**, Tenured Associate Professor at Florida International University  
Ph.D. 2008 **Haseena Ahmed** Research scientist at EQECAT Inc, Oakland, California  
  
M.Sc. 2016 **Tyler Chenhall**, Software engineer at Google.  
M.Sc. 2015 **Linrui Qian**, Software Engineer, Beijing  
M.Sc. 2014 **Diana Hay** MS, Financial adviser, Des Moines  
M.Sc. 2010 **Jin-Young Guo**, Korea  
M.Sc. 2009 **Ozgur Aydogmus**  
M.Sc. 2008 **Hung Phan**  
M.Sc. 2006 **Eric Blabac**

## MENTOR OF POSTDOCTORAL FELLOWS

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2013–2016 **Terrance Pendleton**, PhD, NCSC (2013);  
2011–2015 **Michael Pollack**, PhD, Tulane University (2011)  
2011–2012 **Nianyu Yi**, PhD, Xiangtan University, China (2011)  
2010–2011 **Tae Gab Ha**, PhD, Math, Pusan National University (2010)  
2008–2009 **Jaemin Shin**, PhD, Iowa State University (2008)

Liu has served on many POS committees for PhD students from within and out of Department of Mathematics at Iowa State University.

## COURSES TAUGHT

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- 2021– Math 266 Section 2 & 3, Differential Equations (Fall)
  - Math 680J, Optimal Transport and Deep Learning (Spring)
- 2020– Math 561, Numerical Analysis I.(Fall)
  - Math 266 Section 1, Differential Equations
  - Math 562, Numerical Analysis II (Spring)
- 2019– Math 266 Section 3, Differential Equations (Fall)
  - Math 267 Section 1, 2, & 25, Differential Equations and Transforms
- 2018–2019: Fall 2018–Spring 2019 on Sabbatical Leave
- 2018 – Partial Differential Equations (Math 656)(Spring)
  - Introduction to Partial Differential Equations (Math 385)
  - Focused Research Interaction (Math610LU, VAR)
- 2017– Partial Differential Equations (Math 655) (Fall)
  - Focused Research Interaction (Math610LU, VAR)
  - Introduction to Partial Differential Equations (Math 385) (Spring)
  - Seminar course on PDEs (Math 610B) (team with P. Sacks)
- 2016 – Introduction to Partial Differential Equations (Math 385) (Fall)
  - Matrices and Linear Algebra (Math 207)
  - Matrices and Linear Algebra (Math 207) (Spring)
  - Kinetic theory and kinetic PDEs in biology ( Math 680E)
- 2015 – Introduction to Partial Differential Equations (Math 385)(Fall)
  - Methods of Applied Mathematics I (Math 519)
  - Methods of Applied Mathematics II (Math 520)(Spring)
- 2014– Faculty professional development (on Leave from ISU) (Fall)
  - Differential Equations & Transforms (Math 267) (Spring)
- 2013– Numerical Analysis I (Math 561 I)(Fall)
  - Differential Equations & Transforms (Math 267)
  - Kinetic Theory and Kinetic PDEs in Biology (Math 680E, cr. 3.0)(Spring)
- 2012 – Calculus II (Math 166, Sec. A1 and E1; cr. 4.0)(Fall)
  - Focused Research Interaction (Math610LU, VAR)
  - Finite Difference Methods (Math 517, cr. 3.0)(Spring)
  - Focused Research Interaction (Math610LU, VAR)
- 2011 – Calculus I (Math 165, cr. 4.0 )(Fall)
  - Focused Research Interaction (Math610LU, VAR)
  - Topic course in PDEs ( Math 690, cr. 3.0)(Spring)
  - Focused Research Interaction (Math610LU, VAR)
- 2010 – Numerical Analysis I ( Math 561, cr. 3.0)(Fall)
  - Focused Research Interaction (Math610LU, VAR)
  - Finite Difference Methods (Math 517, cr 3.0) (Spring)
  - Focused Research Interaction (Math610LU, VAR)
- 2009 – Advanced Numerical Analysis (Math 690N)(Fall)
  - Differential Equations & Transforms (Math 267)
  - Fall 2008– Spring 2009 (on sabbatical leave)
- 2008 – Advanced Topics in Numerical Analysis (Math 690N)(Spring)

- Finite mathematics (Math 150)
- 2007 – Finite mathematics (Math 150)(Fall)
  - Modern computational methods (Math 610)
  - Numerical Analysis (Math 503) (Spring)
  - Elementary Differential Equations (Math 266)
- 2006 – Numerical Analysis (Math 502)(Fall)
  - (Focused Research Interaction) Computational methods and Applied PDEs
  - Partial Differential Equations II (Math 656).Evaluations (4.00) (Spring)
  - Elementary Differential Equations (Math 266, Section D). Evaluations (4.00)
- 2005 – Partial Differential Equations (Math 655).Evaluations (4.36) (Fall)
  - Advanced Numerical Methods (Math 690N). Evaluations (4.75)
  - on leave in Spring 2005 at the IMA, University of Minnesota, for the special program on “Mathematics of Materials and Macromolecules: Multiple Scales, Disorder, and Singularities”
- 2004 – Differential Equations & Transforms (Math 267, Section A2 & D1; 3.68, 3.77)(Fall)
  - Finite Difference Methods (Math 517; 4.64)
  - Numerical Analysis II (Math 503; 4.73)(Spring)
- 2003 – Numerical Analysis I (Math 502; 4.70)(Fall)
  - Differential Equations (Math 267, sections A1 & B2; 4.13, 3.92).

## RESEARCH PUBLICATIONS

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### BOOKS AND LECTURE NOTES

1. H. Liu, *Lecture notes on Optimal Transport and Deep Learning*, in preparation (2021).
2. H. Liu and E. Tadmor, *Spectral Dynamics and Eulerian Flows*, “Analytical tools in Multi-D balance laws”, preprint, 2004.
3. Hailiang Liu, Hui Zhang, and Pingwen Zhang A note to paper: Axial symmetry and classification of stationary solutions of Doi-Onsager equation on the sphere with Maier-Saupe potential. arXiv preprint arXiv 1909.13288, 2019.

### ARTICLES SUBMITTED FOR PUBLICATION

1. M. Bhatnagar and H. Liu, Global dynamics of the Euler-alignment system with weakly singular kernel. Submitted to Appl. Math. Letter, Oct. 19, 2021.
2. H. Liu and Xuping Tian, AGDEM: Stochastic gradient decent with energy and momentum. Submitted to ICLR 2022; Sept.29, 2021.
3. Tianxiang Gao, Hailiang Liu, Jia Liu, Hridesh Rajan, and Hongyang Gao, A global convergence theory for deep implicit learning via over-parametrization. Submitted to ICLR 2022; Sept 29, 2021.
4. H. Liu and P. M. Yin, Energy stable Runge-Kutta discontinuous Galerkin schemes for fourth order gradient flows. revised at J. Comput. Phys. arXiv preprint arXiv:2101.00152, 2020.
5. H. Liu and X.P. Tian, AEGD: adaptive gradient decent with energy. revised at SIAM J. on Optimization. arXiv preprint arXiv: 2010.05109.
6. H. Liu and W. Maimaitiyiming, A second order positive scheme for the reduced Poisson-Nernst-Planck system, J. Comp. Appl. Math (under review).

### ARTICLES ACCEPTED FOR PUBLICATION

1. H. Liu, Z.M. Wang, P.M. Yin, and H. Yu, Positivity-preserving third order DG schemes for Poisson–Nernst–Planck equations. Accepted at J. Comput. Phys., arXiv preprint arXiv:2102.00101, 2021.

2. H. Liu and P.-M. Yin, On the SAV-DG method for a class of fourth order gradient flows, Numerical Methods in PDEs, 2021. arXiv preprint arXiv:2008.11877, 2020
3. N.-Y. Yi and H. Liu A mass- and energy-conserved DG method for the Schrödinger-Poisson equation Numerical Algorithms, June 2021. doi: 10.1007/s11075-021-01139-0.
4. H. Liu and J. Shin, Necessary conditions for blow-up solutions to the restricted Euler-Poisson equations, Communication in Mathematical Sciences (CMS), 2021. arXiv preprint ArXiv.2107.04155, 2019.
5. H. Liu and X.P. Tian, Data-driven optimal control of a SEIR model for COVID-19. Comm. Pure and Appl. Anal., 2021. doi:10.3934/cpaa.2021093. arXiv preprint arXiv:2102.00698.
6. W.-L. Cai and H. Liu, Dynamics of many species through competition for resources, in print at Communication in Mathematical Sciences. ArXiv preprint arXiv: 2007.12596, 2019.
7. Matthias Kunik, Hailiang Liu, and Gerald Warnecke, Radially symmetric solutions of the ultra-relativistic Euler equations, to appear in Methods and Applications of Analysis, arXiv preprint arXiv:2002.01181, 2019.

## PUBLICATIONS IN JOURNALS

1. M. Bhatnagar and H. Liu, Well-posedness and critical thresholds in a nonlocal Euler system with relaxation. Discrete & Continuous Dynamical Systems (DCDS), 41(11): 5271–5289, 2021.
2. Alberto Bressan, Yi Jiang, Hailiang Liu, Numerical Study of Non-uniqueness for 2D Compressible Isentropic Euler Equations. J. Compt. Phys. 445: 110588, 2021. arXiv preprint arXiv: 2009.09494
3. X Huo, H Liu, AE Tzavaras, S Wang, An energy stable and positivity-preserving scheme for the Maxwell-Stefan diffusion system, SIAM J. Numer. Anal. 59(5): 2321–2345, 2021. arXiv preprint arXiv:2005.08062, 2020
4. H. Liu and F. Thein, On the invariant region for compressible Euler equations with a general equation of state. Comm. Pure and Appl. Anal., 20 (7 & 8): 2751–2763, 2021. doi:10.3934/cpaa.2021084. in honor of Prof. Chen Shuxing on the occasion of his 80th birthday.
5. Manas Bhatnagar and Hailiang Liu, Sharp critical thresholds in a hyperbolic system with relaxation. Discrete & Continuous Dynamical Systems (DCDS), 41(11): 5271–5289, 2021. doi: 10.3934/dcds.2021098. arXiv preprint arXiv:2012.06804.
6. Hailiang Liu and Peimeng Yin, Unconditionally energy stable discontinuous Galerkin schemes for the Cahn-Hilliard equation. Journal of Computational and Applied Mathematics, 390: 113375, 2021. Arxiv preprint ArXiv:1912.10197.
7. X.-K. Huo and H. Liu, A positivity-preserving and energy stable scheme for a quantum diffusion equation. Numer. Methods Partial Differ. Eq. 1–27, 2021. <https://doi.org/10.1002/num.22809>. arXiv preprint ArXiv: 1912.00813.
8. H. Liu, *Analysis of the direct discontinuous Galerkin method for elliptic and convection-diffusion problems*, accepted Numerische Mathematik, 147(4), 839-867, 2021.
9. H. Liu and W. Maimaitiyiming, Efficient, positive, and energy stable schemes for multi-D Poisson-Nernst-Planck systems. J. Sci. Comput. 87:92, 2021. arXiv preprint ArXiv:2001.08350
10. Manas Bhatnagar and Hailiang Liu, Critical thresholds in 1D pressureless Euler-Poisson systems with varying background, Physica D, 414:132728, 2020.
11. H. Liu and P. Markowich, Selection dynamics for deep neural networks, J. Diff. Equ., 269:11540–11574, 2020.
12. H. Liu and W. Maimaitiyiming, Positive and free energy satisfying schemes for diffusion with interaction potentials, J. Comput. Phys., 419:109483, 2020. ArXiv preprint arXiv: 1910.00151.



13. M. Bhatnagar and H. Liu, Critical thresholds in one dimensional damped Euler-Poisson systems, *Math. Mod. Meth. Appl. Sci. (M3AS)*, 30(5): 891–916, 2020.
14. H. Liu and W. Maimaitiyiming, Unconditional positivity-preserving and energy stable schemes for a reduced Poisson-Nernst-Planck system. *Commun. Comput. Phys.*, 27: 1505–1529, 2020. ArXiv:1909.1316.
15. H. Liu and P.-M. Yin, Unconditional energy stable DG methods for the Swift–Hohenberg equation, *Journal of Scientific Computing*, 81(2): 789–819, 2019. ArXiv Preprint: 1910.00172.
16. X.-B. Feng, H. Liu and S. Ma, Mass-and energy-conserved numerical schemes for nonlinear Schrödinger equations, *Commun. Comput. Phys.*, 26: 1365–1396, 2019. ArXiv:1902.10254.
17. W.-L. Cai, P. Jabin, and H. Liu, Time-asymptotic convergence rates towards discrete steady states of a nonlocal selection-mutation model, *Math. Mod. Meth. Appl. S. (M3AS)*, 29(11), 2063–2087, 2019.
18. H. Liu, J. Ralston and P.-M. Yin, General superpositions of gaussian beams and propagation errors, *Math. Comp.*, 89(322): 675–697, 2019.
19. N. Yi, Y. Huang and H. Liu, A conservative discontinuous Galerkin method for nonlinear electromagnetic Schrödinger equations, *SIAM J. Sci. Comput.*, 41(6): B1389–B1411, 2019.
20. H. Liu, R. Gropler and G. Warnecke, A high order positivity preserving DG method for coagulation fragmentation equations, *SIAM J. Sci. Comput.*, 41(3): B448–B465, 2019.
21. H. Yu and H. Liu, Third order maximum-principle-satisfying DG schemes for convection-diffusion problems with anisotropic diffusivity, *Journal Comp. Physics*. 391: 14–36, 2019.
22. Yi Jiang and H. Liu, *An invariant region preserving limiter for DG schemes to isentropic Euler equations*, *Numerical methods for PDEs*, 35(1):5–33, 2019.
23. H. Liu and L.-R. Qian, *Alternating evolution methods for static Hamilton-Jacobi equations*, *Journal of Computational and Applied Mathematics*, 351: 270–289, 2019.
24. H. Liu and P.-M. Yin, *A mixed discontinuous Galerkin method without interior penalty for time-dependent fourth order problems*, *J. of Scientific Computing*. 77(1), 467–501, 2018.
25. Yi Jiang and H. Liu, *Invariant-region-preserving DG methods for multi-dimensional hyperbolic conservation law systems, with an application to compressible Euler equations*, *Journal of Comput. Phys*. 373(15), 385–409, 2018.
26. H. Liu and H.-R. Wen, *Error estimates of the third order Runge-Kutta alternating evolution discontinuous Galerkin method for convection-diffusion problems*, *ESAIM: Mathematical Modelling and Numerical Analysis (M2AN)*, 52(5): 1709–1732, 2018.
27. H. Liu, Y.-Q. Huang, W.-Y. Lu and N.Y. Yi, *On accuracy of the mass preserving DG method to multi-dimensional Schrödinger equations*, *IMA Journal of Numerical Analysis*. 00:1–32, 2018. <https://doi.org/10.1093/imanum/dry012>.
28. N.-Y. Yi and H. Liu, *An energy conserving discontinuous Galerkin method for a nonlinear variational wave equation*, *Comm. Comput. Phys*. 23(3), 747–772, 2018.
29. Peimeng Yin, Yunqing Huang and H. Liu, *A priori estimates for the iterative DG method for one-dimensional Poisson-Boltzmann equation*, *Comm. Comput. Phys*. 23(1):168–197, 2018.
30. H. Liu and H.-R. Wen, *Error estimates of the AEDG method for one-dimensional linear convection-diffusion equations*, *Math Comp*. 87(309): 123–148, 2018.
31. P.E. Jabin and H. Liu, *On a nonlocal selection-mutation model with a gradient flow structure*, *Nonlinearity*, 30:4220–4238, 2017.
32. H. Liu and Maksym Pryporov, *Error estimates for Gaussian beam methods applied to symmetric strictly hyperbolic systems*, *Wave Motion*. 73:57–75, 2017.

33. W.-L. Cai and H. Liu, *A finite volume method for nonlocal competition-mutation equations with a gradient flow structure*, ESAIM: M2AN, 51(4): 1223–1243, 2017.
34. H. Liu and Z.-M. Wang, *A free energy satisfying discontinuous Galerkin method for Poisson-Nernst-Planck systems*, J. Comput. Phys. 238: 413–437, 2017.
35. W.-X. Cao, H. Liu and Z.-M. Zhang, *Superconvergence of the direct discontinuous Galerkin method for convection-diffusion equations*, Numerical Methods for Partial Differential Equations, 33(1): 290–317, 2017.
36. T. Li, H. Liu and L.-H. Wang, *On traveling wave solutions to the Keller-Segel model of mixed type*, J. Differential Equations, 261:7080–7098, 2016.
37. D. Levermore, H. Liu and R. Pego, *Global well-posedness for a model of the Kompaneets equation and Bose-Einstein condensation*, SIAM J. Math. Anal. 48(4): 2454–2494, 2016.
38. H. Liu, O. Runborg and N. Tanushev, *Sobolev and max norm error estimates for gaussian beam superpositions*, Comm. Math. Sci. 14(7): 2041–2076, 2016.
39. H. Liu and Y.-L. Xing, *An invariant preserving discontinuous Galerkin methods for the Camassa-Holm equation*, SIAM J. Sci. Comput. 38(4): A1919–1934, 2016.
40. H. Liu and N.-Y. Yi, *A Hamiltonian preserving discontinuous Galerkin method for the generalized Korteweg-de Vries equation*, J. Comp. Phys, 15: 776–796, 2016.
41. H. Liu and Z.-M. Wang, *An entropy satisfying discontinuous Galerkin method for nonlinear Fokker-Planck equations*, J Sci Comput., 68:1217–1240, 2016.
42. H. Liu and T. Pendleton, *On invariant-preserving finite difference schemes for the Camassa-Holm equation*, Communication in Computational Physics, 19(04):1015–1041, 2016.
43. H. Liu and M. Pollack, *Alternating evolution discontinuous Galerkin methods for convection-diffusion equations*, J. Comp. Phys. 307: 574–592, 2016.
44. Y. Lee and H. Liu, *Threshold for shock formation in the hyperbolic Keller–Segel model*, Appl. Math. Letters., 50: 56–63, 2015.
45. H. Liu, W.-L. Cai and N. Su, *Entropy satisfying schemes for computing selection dynamics in competitive interactions*, SIAM J. Numer. Anal., 53(3): 1393–1417, 2015.
46. W.-L. Cai, P. Jabin and H. Liu, *Time-asymptotic convergence rates towards the discrete evolutionary stable distribution*, Mathematical Models and Methods in Applied Sciences (M3AS), 25(8): 1589–1616, 2015.
47. W.-Y. Lu, Y.-Q. Huang and H. Liu, *Mass preserving direct discontinuous Galerkin methods for Schrödinger equations* J. Comp. Phys., 282(1): 210–226, 2015.
48. Y. Lee and H. Liu, *Thresholds for shock formation in traffic flow models with arrhenius look-ahead dynamics*, DCDS Ser A. 35(1): 323–339, 2015.
49. Tae-Gab Ha and H. Liu, *On traveling wave solutions of the the theta class of dispersive equations*, Journal of Math. Anal. Appl., 421(1): 399–414, 2015.
50. H. Liu and Nattapol Ploymaklam, *An energy preserving local discontinuous Galerkin method for the Burgers-Poisson equation*, Numerische Mathematik, 129(2):321–351, 2015.
51. H. Liu, *Optimal error estimates of the direct discontinuous Galerkin method for convection-diffusion equations*, Math. Comp., 84: 2263–2295, 2015.
52. H. Liu and Maksym Pryporov, *Error estimates of the Bloch band-based Gaussian beam superposition for the Schrödinger equation*, Contemporary Math., 640: 87–114, 2015.

53. H. Liu and H. Yu, *The entropy satisfying discontinuous Galerkin method for Fokker–Planck equations*, J. Sci. Comput., 62: 803–830, 2015.
54. H. Liu and Zhongming Wang, *A free energy satisfying finite difference method for Poisson–Nernst–Planck equations*, J. Comput. Phys., 268: 363–376, 2014.
55. H. Liu and H. Yu, *Maximum-principle-satisfying third order discontinuous Galerkin schemes for Fokker–Planck equations*, SIAM J. Sci. Comput., 36(5): A2296–A2325, 2014.
56. Peimeng Yin, Yunqing Huang and H. Liu, *An iterative discontinuous Galerkin method for solving the nonlinear Poisson–Boltzmann equation*, Commun. Comput. Phys., 16(2): 491–515, 2014.
57. H. Liu, J. Ralston, O. Runborg and N. Tanushev, *Gaussian beam methods for the Helmholtz equation*, SIAM J. Appl. Math., 74(3): 771–793, 2014.
58. H. Liu and M. Pollack, *Alternating evolution DG methods for Hamilton–Jacobi equations*, J. Comput. Phys., 258: 31–46, 2014.
59. H. Liu and H. Yu, *Entropy/energy stable schemes for evolutionary dispersal models*, J. Comp. Phys. 256: 656–677, 2014.
60. H. Liu, Y. Huang and N.-Y. Yi, *A conservative discontinuous Galerkin method for the Degasperis–Procesi equation*, Methods and Applications of Analysis, 21(1): 083–106, 2014.
61. H. Liu, *The alternating evolution methods for first order nonlinear partial differential equations*, Communications in Information and Systems (CIS), 13(3): 291–325, 2013.
62. Yongki Lee and Hailiang Liu, *Thresholds in three-dimensional restricted Euler–Poisson equations*, Phys. D. 262: 59–70, 2013.
63. N.-Y. Yi, Y.Q. Huang and H. Liu, *A direct discontinuous Galerkin method for the Korteweg–de Vries equation: energy conservation and boundary effect*, J. Comp. Phys. 242: 351–366, 2013.
64. H. Liu, Michael Pollack and Haseena Saran, *Alternating evolution schemes for Hamilton–Jacobi equations*, SIAM J. Sci. Comput. 35(1): 122–149, 2013.
65. H. Liu, O. Runborg and N. Tanushev, *Error estimates for Gaussian beam superpositions*, Math Comput. 82: 919–952, 2013.
66. H. Liu and J. Shin, *The Cauchy–Dirichlet problem for the FENE Dumbbell model of polymeric flows*. SIAM J. Math Anal. 44(5): 3617–3648, 2012.
67. H. Liu and H. Yu, *An entropy satisfying conservative method for the Fokker Planck equation of FENE dumbbell model*, SIAM J. Numer. Anal. 50(3): 1207–1239, 2012.
68. Yunqing Huang, Hailiang Liu and Nianyu Yi, *Recovery of interface derivatives from the piecewise  $L^2$  projection*. J. Comp. Phys. 231: 1230–1243, 2012.
69. H. Liu and J. Shin, *Global well-posedness for the microscopic FENE model with a sharp boundary condition*. Journal Diff. Equ. 252: 641–662, 2012.
70. P. Degond, H. Liu, D. Savelief and M-H. Vignal, *Numerical approximation of the Euler–Poisson–Boltzmann model in the quasineutral limit*. Journal of Scientific Computing, 51(1): 59–86, 2012.
71. H. Saran and H. Liu, *Alternating evolution (AE) schemes for hyperbolic conservation laws*, SIAM J. on Scientific Computing. 33(6): 3210–3240, 2011.
72. H. Liu, Z.-Y. Yin, *Global regularity, and wave breaking phenomena in a class of nonlocal dispersive equations*, Contemporary Mathematics, 526: 274–294, 2011. Nonlinear Partial Differential Equations and Hyperbolic Wave Phenomena. Helge Holden and Kenneth H. Karlsen, Editors.
73. H. Liu, Z.-M. Wang and R. Fox, *A level set approach for dilute non-collisional fluid-particle flows*. Journal of Computational Physics 230 (4): 920–936, 2011.

74. H. Liu and J. Yan, *The Direct Discontinuous Galerkin (DDG) method for diffusion with interface corrections*, Commun. Comput. Phys. **8**(3): 541–564, 2010.
75. H. Liu and J. Ralston, *Recovery of high frequency wave fields from phase space based measurements*, Multiscale Model. Simul. **8**(2): 622–644, 2010.
76. H. Liu, E. Tadmor and D. Wei, *Global regularity of the 4D restricted Euler equations*, Physics D: Nonlinear Phenomena, **239**(14): 1225–1231, 2010.
77. H. Liu and J. Ralston, *Recovery of high frequency wave fields for the acoustic wave equation*, Multiscale Model. Simul. **8**(2): 428–444, 2009.
78. P. Degond and H. Liu, *Kinetic models for polymers with inertial effects*, Networks and Heterogeneous Media. **4**(4): 625–647, 2009.
79. Tong Li and H. Liu, *Critical thresholds in hyperbolic relaxation systems*, J. Diff. Equ. **247**(1): 33–48, 2009.
80. H. Liu and Zhongming Wang, *A Bloch band based level set method for computing the semi-classical limit of Schrödinger equations*, J. Comp. Phys. **228**(9): 3326–3344, 2009.
81. Tong Li and H. Liu, *Critical thresholds in a relaxation system with resonance of characteristic speeds*, Discrete and Continuous Dynamical Systems, Series A. **24**(2): 511–521, 2009.
82. Liu, Hailiang; Yan, Jue, *The Direct Discontinuous Galerkin (DDG) methods for diffusion problems*, SIAM Journal on Numerical Analysis, **47**(1): 475–698, 2009.
83. H. Liu, *On discreteness of the Hopf equation*, Acta Mathematicae Applicatae Sinica **24**(3): 423–440, 2008.
84. Liu, Chun; Liu, Hailiang. *Boundary conditions for the microscopic FENE models*, SIAM J. Appl. Math. **68** (5): 1304–1315, 2008.
85. Liu, Hailiang. *An Alternating Evolution Approximation to systems of Hyperbolic Conservation Laws*, Journal of Hyperbolic Differential Equations, **5**(2): 1–27, 2008.
86. Liu, Hailiang and Sparber, C. *Rigorous derivation of the hydrodynamical equations for rotating superfluids*, Mathematical Models and Methods in Applied Sciences, **18**(5): 689–706, 2008.
87. Liu, Hailiang; Wang, Zhongming. *Superposition of Multi-valued Solutions in High Frequency Wave Dynamics*, Journal of Sci. Comp. **35**(2-3): 192–218, 2008.
88. Marco Di Francesco, Klemens Fellner, and Hailiang Liu. *A non-local conservation law with nonlinear ‘radiation’ inhomogeneity*, J. Hyperbolic Diff. Equ. **5**(1): 1–23, 2008.
89. Li, Tong; Liu, Hailiang, *Critical thresholds in a relaxation model for traffic flows*, Indiana Univ. Math. Journal, **57**(3): 1409–1430, 2008.
90. Liu, Hailiang. *Global orientation dynamics for liquid crystalline polymers*, Physics D. Non-linear Phenomena. **228**(2):122–129, 2007.
91. Liu, Hailiang; Wang, Zhongming. *A field space based level set method for computing multi-valued solutions to Euler-Poisson equations*, Journal of Computational Physics, **225**: 591–614, 2007.
92. Liu, Hailiang; Wang, Zhongming. *Computing Multi-valued velocity and electric fields for 1D Euler-Poisson equations*, Applied Numerical Mathematik **57**: 821–836, 2007.
93. H. Liu, S. Osher and R. Tsai, *Multi-valued solution and level set methods in computational high frequency wave propagation*, Commun. Comput. Phys. **1**(5): 765–804, 2006.
94. Liu, Hailiang; Yan, Jue. *A local discontinuous Galerkin method for the Korteweg-de Vries equation with boundary effect*, Journal of Computational Physics, **215**: 197–218, 2006.

95. Liu, Hailiang, *Critical thresholds in the semiclassical limit of 2-D rotational Schrödinger equations*, Z. Angew. Math. Phys. **57**(1): 42–58, 2006.
96. Liu, Hailiang. *Wave breaking in a class of nonlocal dispersive wave equations*, Journal of Nonlinear Mathematical Physics, **13**(3): 441–466, 2006.
97. Liu, Hailiang; Cheng, Li-Tien; Osher, Stanley, *A level set framework for capturing multi-valued solutions of nonlinear first-order equations*, Journal of Sci. Computing, **29**: 353–373, 2006.
98. S. Jin, H. Liu, S. Osher and R. Tsai, *Computing multi-valued physical observables for the high frequency limit of symmetric hyperbolic systems*. J. Comput. Phys. **210**(2): 497–518, 2005.
99. S. Jin, H. Liu, S. Osher and R. Tsai, *Computing multi-valued physical observables for the semiclassical limit of the Schrödinger equations*, J. Comput. Phys. **205**(1): 222–241, 2005.
100. H. Liu, H. Zhang and P.W. Zhang, *Axial Symmetry and Classification of Stationary Solutions of Doi-Onsager Equation on the Sphere with Maier-Saupe Potential*, Comm. Math. Sci. **3**(2): 201–218, 2005.
101. T. Li and H. Liu, *Stability of a traffic flow model with nonconvex relaxation*, Comm. Math. Sci., **3**(2): 101–118, 2005.
102. Fan, Haitao; Liu, Hailiang, *Pattern formation, wave propagation and stability in conservation laws with slow diffusion and fast reaction*, J. Hyperbolic Differ. Equ. **1**(4): 605–626, 2004.
103. G.-Q. Chen and H. Liu, *Concentration and cavitation in solutions of the Euler equations for non-isentropic fluids as the pressure vanishes*, Physics. D. **189**: 141–165, 2004.
104. H. Liu and E. Tadmor, *Rotation prevents finite time breakdown*, Physica D, **188**: 262–276, 2004.
105. H. Liu and M. Slemrod, *KdV dynamics in the Plasma-sheath transition*, Appl. Math. Lett. **17**: 401–419, 2004.
106. H. Liu and E. Tadmor, *Critical thresholds in 2-D restricted Euler-Poisson equations*, SIAM Appl. Math. **63**: 1889–1910, 2003.
107. L.T. Cheng, H. Liu and S. Osher, *Computational high frequency wave propagation using the level set method, with applications to the semi-classical limit of Schrödinger equations*, Comm. Math. Sci. **1**(3): 593–621, 2003.
108. J. Pan and H. Liu, *Convergence rates to travelling waves of viscous conservation laws with dispersion*, J. Diff. Equ. **187**: 337–358, 2003.
109. H. Liu, *Asymptotic stability of relaxation shock profiles for hyperbolic conservation laws*, J. Diff. Equ. **192**: 285–307, 2003.
110. G.-Q. Chen and H. Liu, *Formation of delta-shocks and vacuum states in the vanishing pressure limit of solutions to the isentropic Euler equations*, SIAM J. Math Anal. **34**: 925–938, 2003.
111. H. Liu, *The  $L^1$  global decay to discrete shocks for scalar monotone schemes*, Math. Comp. **72**: 227–245, 2003.
112. H. Liu and E. Tadmor, *Spectral dynamics of the velocity gradient field in restricted flows*, Commun. Math. Phys. **228**: 435–466, 2002.
113. H. Liu and E. Tadmor, *Semi-classical limit of the nonlinear Schrodinger-Poisson equation with sub-critical initial data*, Methods and Applications of Analysis, **9**(4): 517–532, 2002.
114. S. Engelberg, H. Liu and E. Tadmor, *Critical threshold phenomena in Euler-Poisson equations*, Indiana University Mathematics Journal, **50**(1): 109–157, 2001.
115. H. Liu, J. Wang and G. Warnecke, *Convergence of a splitting scheme applied to the R-W model of the Boltzmann equation*, Journal of Computational and Applied Mathematics, **134**(1-2): 343–367, 2001.

116. H. Liu and E. Tadmor, *Critical thresholds in a convolution model for nonlinear conservation laws*, SIAM J. Math. Anal. **33**: 930–945, 2001.
117. H. Liu, J. Wang and G. Warnecke, *The  $Lip^+$  stability and error estimates for a relaxation scheme*, SIAM J. Numer. Anal. **38**(4): 1154–1170, 2001.
118. H. Liu and W.-A. Yong, *Time-asymptotic stability of boundary layers for a hyperbolic relaxation system*, Commun. Partial Diff. Equ. **26**: 1323–1343, 2001.
119. H. Liu, *The  $L^p$  stability of relaxation rarefaction profiles*, J. Differ Equations, **171**: 397-411, 2001.
120. H. Liu and R. Natalini, *Long-time diffusive behavior of solutions to a hyperbolic relaxation system*, Asymptotic Analysis, **25**: 21-38, 2001.
121. H. Liu, *Asymptotic decay to the relaxation shock fronts in two dimensions*, Proceedings of the Royal Society of Edinburgh: Section A. **131 A**: 1385–1410, 2001.
122. H. Liu, J. Wang and G. Warnecke, *Convergence rate to discrete shocks for non-convex conservation laws*, Numerische Mathematik, **88**: 513-541, 2001.
123. H. Liu and G. Warnecke, *Convergence rates for relaxation schemes approximating conservation laws*, SIAM J. Numer. Anal. **37**(4): 1316-1337, 2000.
124. H. Liu, *Convergence rates to the discrete travelling wave for relaxation schemes*, Math. Comp. **69**(230): 583–608, 2000.
125. S. Jin and H. Liu, *A diffusive sub-characteristic condition for hyperbolic systems with diffusion relaxation*, Transport Theory and Statistical Physics, **29**(3-5): 583-593, 2000.
126. H. Liu, J. Wang and T. Yang, *Nonlinear stability and existence of stationary discrete travelling waves for the relaxing schemes*, Japan J. Indust. Appl. Math. **16**: 195-224, 1999.
127. H. Liu and J. Pan, *On stability of travelling waves of Burgers-Fisher equation*, Ann. Differential Equations, **14**: 37-47, 1998.
128. S. Jin and H. Liu, *Diffusion limit of a hyperbolic system with relaxation*, Methods and Applications of Analysis **5**: 317-334, 1998.
129. H. Liu, J. Wang and T. Yang, *Stability for a relaxation model with a non-convex flux*, SIAM J. Math. Anal. **29**: 18–29, 1998.
130. H. Liu, *Nonlinear stability of shock profiles for non-convex model equations with degenerate shock*, J. Partial. Diff. Eqs. **11**: 209–230, 1998.
131. H. Liu and J. Wang, *Asymptotic stability of stationary discrete shocks of Lax-Friedrichs scheme for non-convex conservation laws*, Japan J. Indust. Appl. Math. **15**: 1–16, 1998.
132. H. Liu, C. W. Woo and T. Yang, *Decay rate for travelling waves of a relaxation model*, J. Diff. Equ. **134**: 343-367, 1997.
133. H. Liu, J. Wang and T. Yang, *Existence of the discrete travelling waves for a relaxing scheme*, Appl. Math. Lett., **10**: 117-122, 1997.
134. H. Liu, *Asymptotic stability of shock profiles for non-convex convection diffusion equation*, Appl. Math. Lett. **10**: 129-134, 1997.
135. H. Liu and J. Wang, *Decay rate for perturbations of stationary discrete shocks for convex scalar conservation laws*, Math. Comp. **66**: 69-84, 1997.
136. H. Liu and J. Wang, *Asymptotic stability of travelling wave solutions for a hyperbolic system with relaxation terms*, Beijing Math. **2**: 119-130, 1996.

137. H. Liu, *Asymptotic properties of solutions to non-convex scalar conservation laws*, *Gaoxiao Yingyong Shuxue Xuebao*, Ser. **A**. **11**: 277-282, 1996 (in Chinese).
138. H. Liu and J. Wang, *Nonlinear stability of stationary discrete profiles of non-convex scalar conservation laws*, *Math. Comp.* **65**: 1137-1153, 1996.
139. H. Liu and J. Pan, *Decay rate for perturbations of viscous shock profiles for non-convex convection-diffusion equation*, *Appl. Functional Anal.* **2**: 171-176, 1995.
140. H. Liu and J. Pan, *Propagation and cancellation of initial oscillations*, *J. Henan Normal Univ.* **22**(4): 12-15, 1994. (in Chinese).
141. H. Liu, *An existence theorem for radial positive solutions of nonlinear elliptic equations*, *Sys. Sci. Math. Sci.* **7**: 1-4, 1994.
142. H. Liu, *Asymptotic stability of traveling waves for one-dimensional viscous conservation laws*, *J. Henan Normal Univ.* **20**: 1-4, 1992 (in Chinese).
143. H. Liu, *The interactions of shock waves of non-strictly hyperbolic systems*, *Acta Math. Scientia*, **12** (1992), 312-336.
144. H. Liu, *Large time behavior of solutions of the porous medium equation with convection*, *Acta Mathematicae Appl. Sinica* **15**: 239-256, 1992.

#### **PUBLICATION IN PROCEEDINGS, REPORTS**

1. Hailiang Liu, *On structure-preserving high order methods for conservation laws*, HYP 2018: Theory, Numerics and Applications of Hyperbolic Problems. 2019.
2. Yi Jiang and H. Liu, *An Invariant-region-preserving (IRP) limiter to DG methods for compressible Euler equations*, HYP 2016: Theory, Numerics and Applications of Hyperbolic Problems II, 71-83, 2018. The Springer Proceedings in Mathematics and Statistics book series (PROMS, volume 237).
3. Liu, Hailiang. *Relaxation dynamics, scaling limits and convergence of relaxation schemes*. Analysis and numerics for conservation laws, 453-478, Springer, Berlin, 2005.
4. H. Liu, *Approximation of singular concentration in compressible flows*, Proceedings of the Second M.I.T. Conference on Computational Fluid and Solid Mechanics, June 2003.
5. H. Liu and E. Tadmor, *Critical thresholds and conditional stability for Euler equations and related models*, Proceedings of the Ninth International Conference on "Hyperbolic Problems: Theory, Numerics, Applications", Editors: T.Y. Hou and E. Tadmor, Springer, 227-240, 2002.
6. H. Liu and G. Warnecke, *Initial layer effects and convergence rates for relaxation methods*. In: International Conference on Differential Equations (EQUADIFF 99)(Hrsg. B. Fiedler et al.), World Scientific, Singapore, 301-307, 2000.
7. H. Liu, *On the diffusion limit of a hyperbolic relaxation system*, Hyperbolic problems: theory, numerics, applications, Vol. II (Zürich, 1998), Internat. Ser. Numer. Math., 130, Birkhauser, Basel, 671-679, 1999.

#### **THESES**

- (A) Large time behavior of solutions of the porous medium equation with convection, Master thesis (1988), Tsinghua University, Beijing (in Chinese).
- (B) Nonlinear stability of viscous shock waves and discrete shock waves, Ph.D. Dissertation (1995), Academia Sinica, Beijing .

## COLLABORATORS IN RECENT YEARS INCLUDE

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### a) Collaboration with colleagues:

Alberto Bressan (PSU), Wenli Cai (CUMT, Beijing), Waixiang Cao (Beijing Normal Univ.), Gui-Qiang Chen (Oxford University), Li-Tien Cheng (UCSD), Pierre Degond (Imperial College, London), Marco Francesco (UK), Shlomo Engelberg (Israel), Haitao Fan (Georgetown), Klemens Fellner (Vienna), Xiaobing Feng (UTX), Yunqing Huang (XTU), Xiaokai Xuo (KAUST), Pierre Jabin (UMD), Shi Jin (Shanghai), Matthias Kunik (Univ. Magdeburg), Dave Levermore (UMD), Tong Li (UI), Chun Liu (IIT, Chicago), Peter Markowich (KAUST), Stanley Osher (UCLA), Robert Pego (CMU), Terrence Pendleton (Drake Univ.), Michael Pollack (ISU), Yuming Qin (Shanghai), James Ralston (UCLA), Olof Runborg (KTH, Sweden), Haseena Saran (India), Jaemin Shin (Korea), Marshall Slemrod (UW-Madison), Christian Sparber (IIC, Chicago), Eitan Tadmor (Univ. Maryland), Changhui Tan (USC), Nick Tanushev (Houston), Richard Tsai (UT-Austin), T. Tzavaras (KAUST), Jinghua Wang (Beijing), Zhongming Wang (FIU), Gerald Warnecke (Germany), Dongming Wei (New York), Hairui Wen (BIT, Beijing), Jue Yan (ISU), Tong Yang (HK), Nianyu Yi (XTU), Peimeng Yin (Oak Ridge DOE Lab), Zhaoyang Yin (Zhongshan University), Wenan Yong (Tsinghua), Hui Yu (ISU), Hui Zhang (Beijing Normal; deceased), Pingwen Zhang (PKU, Beijing), Zhimin Zhang (Center of Computing, Beijing)

### b) Interdisciplinary collaborations:

James Evans (Ames Lab, ISU), Rodney Fox (Chem. Engineering, ISU), Xueyu Song (Chemistry), Soumik Sarkar (Mech), Baskar Ganapathysubramanian (Mech.), Zhiqun Lin (Materials Science & Engineering, ISU), and Zhijian Wang (AeroE, ISU).

## EXTENDED VISITS

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Visiting Professor, King Abdullah University of Science and Technology

March 5 – May 30, 2019

Alexander von Humboldt Fellow, January 01–February 28, 2019

Visiting Consultant, King Abdullah University of Science and Technology

September 1– October 31, 2018

Visiting Professor, Beijing Normal University, Beijing, July 2017

Zhengzhou University, Zhengzhou, June-July 2016

Xiangtan University, Xiangtan, July 2015

Imperial College London, December 18–26, 2014

Institute of Numerical Analysis, University of Magdeburg, December 7-18, 2014

Visiting Professor, Laboratoire J.-L. Lions, University Pierre et Marie Curie, November 16– December 6, 2014

Center of Mathematical Sciences, Tsinghua University, September 1–November 8, 2014

FuRong Scholar of Hunan Province, XTU, Xiangtan, 2011–2013

Center of Mathematical Sciences, Tsinghua University, May 5–June 15, 2012

Visiting Professor, Xiangtan University, Xiangtan, June 01–June 30, 2010

Visiting Professor, Peking University, Beijing, July 21–August 22, 2009

Long term visitor, Institute of Pure and Applied Mathematics, Los Angeles, April 1–June 12, 2009

Visiting Professor, Department of Mathematics, UCLA, January 1–March 31, 2009

Visiting Professor, CAS, Norwegian Academy of Sciences, Oslo, December 2008

Visiting Professor, CSCAMM, University of Maryland, Sept-Oct. 2008

Short term visitor, Beijing Institute of Technology, Beijing, July-August 2007



Visiting Professor, University of Toulouse, France, June 2007  
 Short term visitor, Pauli Institute of Science, Vienna, May 2006  
 Long term visitor, Institute of Mathematics and Applications, Minneapolis, Spring 2005  
 Visiting Professor, The Modern Laboratory of Mathematics, Fudan University, May-June 2004  
 Short term visitor, Institute of Computational Mathematics, CAS, Beijing, July 2004  
 Short term visitor, Isaac Newton Institute for Mathematical Sciences, UK, 2003  
 Research Fellow, Institute of Pure and Applied Mathematics, Los Angeles, 2001  
 Short term visitor, Hebrew University of Jerusalem, February 1999  
 Short term visitor, Consiglio Nazionale delle Ricerche, Roma, Italy, March 1998  
 Short term visitor, Georgia Institute of Technology, November 1996  
 Short term visitor, University of Wisconsin-Madison, October 1996  
 Research Assistant, City University of Hong Kong, 1995-1996

## **PARTICIPATION AND INVITED LECTURES**

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### CONFERENCES

Iowa PDE seminar, Ames, Oct. 20, 2021  
 AMS Sectional Meeting, virtually, Oct. 10, 2021  
 SIAM Conference on Mathematics of Data Science (MDS20), May 4-June 30, 2020.  
 Minisymposium on “Deep Learning via Optimal Control in Data Space”, virtual program, June 17-18, 2020.  
 Midwest Numerical Analysis Day 2020, Rolla, Missouri, March 20, 2020.  
 Workshop on emergent phenomena from kinetic models to social hydrodynamics, IMS, Singapore, December 16 – 20, 2019.  
 The 5th annual meeting of SIAM Central States Section. Ames, Iowa, October 19–20, 2019.  
 International Mathematics Forum (TSIMF) workshop on PDE modeling and analysis in Bioscience and complex media”. Sanya, July 29–August 3, 2019.  
 International Congress on Industrial and Applied Mathematics (ICIAM 2019): 15–19 July, 2019, Valencia, Spain.  
 (i) Talk #1 at the Minisymposia: Recent advances on numerical methods and theoretical analysis of complex fluids.  
 (ii) Talk #2 at the Minisymposia: Entropy methods for multi-dimensional systems in Mechanics.  
 International workshop on numerical PDEs, Hangzhou, June 1-4, 2019.  
 SIAM Conference on Computational Science and Engineering (CSE19), February 25–March 1, 2019, Spokane, Washington, US.  
 International Mathematics Forum (TSIMF) workshop on Structure-preserving DG methods for time-dependent problems”, Sanya, January 15, 2019.  
 International summer school in Applied Mathematics, Xiangtan University, July 15–August 03, 2018.  
 Invited speaker, XVII International Conference on Hyperbolic Problems Theory, Numerics, Applications, Penn State University, June 25-29, 2018.  
 International Mathematics Forum (TSIMF) workshop on “Modeling, Analysis, Simulations and Applications of Inter-Facial Dynamics and FSI Problems”, Sanya, June 04–08, 2018.  
 International Conference on Applied Mathematics Advances in scientific computing of multi-physics, Zhengzhou University, May 25–27, 2018.  
 Mid-West Numerical Analysis Day, Kansas University, April 14, 2018.  
 Florida International University, Miami, January 3-6, 2018.  
 International Mathematics Forum (TSIMF) workshop “PDE Model and Nonlinear Waves for Fluids and

Plasma Workshop, Sanya, China, December 25–29, 2017.

SIAM conference on analysis of PDEs, Baltimore, December, 2017.

International Conference on Numerical Simulation for Multimaterial and Multiphysics Flows (ICNM 2017), Beijing, July 3-7, 2017.

KI-Net workshop on modeling, analysis and numerics of kinetic equations, Texas-Austin, May. 8-12, 2017.

Midwest Numerical Day, Lincoln, April 22, 2017.

International Workshop on "Mathematical frontier issues in materials science", Zhengzhou University, January 5-8, 2017.

Conference on Recent Advances in Analysis and Numerics of Hyperbolic Conservation Laws, Magdeburg, Germany, September 8–10, 2016.

The XIII international conference on Hyperbolic problems: theory, computation, and applications, Aachen, Germany, August 1–5, 2016.

International conference on partial differential equations, Beijing, May 28-29, 2016.

Workshop on Computational and Applied Mathematics Day, Beijing, May 28, 2016.

(Plenary speaker) Midwest Numerical Day, La Crosse, April 23, 2016.

KI-Net workshop on modeling, analysis and numerics of kinetic equations, Providence, Feb. 5-6, 2016.

SIAM conference on analysis of PDEs, Scottsdale, December 6–10, 2015.

International conference on Partial Differential Equations, Beijing, August 15–17, 2015.

Frontiers of Applied and Computational Mathematics, Beijing, August 07-09, 2015.

The 8th International Conference on Industrial and Applied Mathematics (ICIAM), Beijing, August 10-14, 2015.

International conference on Partial Differential Equations, Wuhan, August 1–3, 2015.

Workshop on Computational and Applied Mathematics, Beijing, July 4th, 2015.

SIAM Central States Annual Meeting, Rolla, April 10-12, 2015.

Iowa PDE conference, Ames, March 28, 2015.

2014 International Conference of Mathematics Information and Computational Sciences, Beijing, October 20-24, 2014.

Workshop on nonlinear dispersive wave equations, Ningbo University, July 12-13, 2014.

NIMS hot topics workshop "From Mechanics to Geometry", Seoul, May 26-29, 2014.

Collective Behavior: Macroscopic versus Kinetic Descriptions, Imperial College, London, May 19 – 23, 2014.

AMS Southeastern Spring Sectional Meeting Knoxville, Tennessee March 22, 2014.

Spectral Theory and Partial Differential Equations, UCLA, June 17–21, 2013.

Quantum Systems: A Mathematical Journey from Few to Many Particles, University of Maryland, May 13 - 16, 2013.

AMS special session on "Kinetic and hydrodynamic PDE-based descriptions of multi-scale phenomena", Ames, Apr 27 - 28, 2013.

AMS special session on "Numerical Analysis and Scientific Computing", Ames, April 27–28, 2013.

Kinetic theory for the emergence of complex behavior in social and economic systems  
Arizona State University, Feb 22–24, 2013.

Transport models for Collective Dynamics in Biological Systems,  
North Carolina State University, Jan 15 –Jan 18, 2013.

PDE workshop, Taiwan National Central University, December 21, 2012.

Workshop on Numerical PDEs, National Chiao Tung University, December 24, 2012

RIW workshop on kinetic theory and molecular modeling,  
Iowa State University, Oct. 20–21, 2012.

2012 Young Researchers Workshop: Kinetic Description of Multiscale Phenomena, Oct 10-13, 2012

KIT: Research on kinetic theory of photons, CSCAMM, July 30–Aug 03, 2012.  
 Computational workshop at XTU, Xiangtan, June 25, 2012.  
 International workshop on numerical PDEs, Kaifeng, June 08-10, 2012.  
 Beijing CAM day: Computational and Applied Mathematics, June 02, 2012.  
 International conference on Scientific Computing, Nanjing, May 22-25, 2012.  
 Inauguration Workshop of Applied Mathematics, UC RIVERSIDE, May 05-06, 2012.  
 International conference in applied mathematics in honor of Stanley Osher, April 04-06, 2012.  
 AMS sectional conference at Lawrence, March 30-April 1, 2012.  
 KI-Net organization meeting, Maryland, March 8-10, 2012.  
 IPAM Kinetic reunion conference, Lake Arrowhead, December 10-17, 2011  
 SIAM Conference in Analysis of PDEs, San Diego, November 14-17, 2011  
 Applied Math conference, Waterloo, Canada, July 25-29, 2011  
 ICIAM 2011, Vancouver, Canada, July 18–22, 2011  
 International Computational Math Conference, Hangzhou, China, June 17–21  
 International Applied Math Conference, Tianjin/Beijing, China, June 13-17, 2011  
 NSF Kinetic FRG Annual Meeting, Madison, WI, May 23–27, 2011  
 Research SQuaRE meeting at AIM, Palo Alto, CA, May 9-13, 2011  
 SIAM meeting on Geoscience, Long Beach, March 21-24, 2011  
 AMS sectional meeting, Iowa city, March 18-20, 2011.  
 Pre-AMS workshop on PDEs, Iowa City, March 17, 2011.  
 Pre-AMS workshop on Numerical Analysis, Iowa City, March 17, 2011.  
 Kinetic Transport: Reunion Conference I, Lake Arrowhead, December 13–17, 2010.  
 The international conference on hyperbolic problems, Beijing, June 15–19, 2010.  
 International conference on Applied Analysis, Donghua University, Shanghai, June 5-8, 2010.  
 International PDE conference at Fudan University, Shanghai, May 31–June 4, 2010.  
 The 2010 CMMSE Conference, Madison, WI, May 24-26, 2010  
 Annual FRG meeting, Brown University, May 9–14, 2010.  
 Iowa PDE conference, Iowa city, April 31–May 02, 2010.  
 NSF FRG workshop on “Kinetic Description of Multi-scale Phenomena”, College Park, Maryland, March 5-6, 2009.  
 NSF founded IPAM workshop on “Computational Kinetic Transport and Hybrid Methods”. Los Angeles, March 31-April 03, 2009.  
 The retreat workshop of the IPAM program on “Quantum and Kinetic Transport: Analysis, Computations, and New Applications: March 9 - June 12, 2009”. Lake Arrowhead, June 9–14, 2009.  
 NSF FRG Annual Conference on “Kinetic Description of Multi-scale Phenomena”, College Park, Maryland, September 22-26, 2009.  
 Iowa PDE workshop, Ames, Iowa, October 10, 2009.  
 SIAM PDE Analysis Conference, Miami, December 7–10, 2009.  
 The first NSF FRG meeting on “Kinetic Description of Multi-scale Phenomena”, Maryland, October 05-06, 2008.  
 The Conference on Partial Differential Equations, Iowa City, July 24-27, 2008.  
 The 12th International Conference on Hyperbolic Problems: Theory, Numerics, and Applications (HYP2008), Maryland, June 9 - 13, 2008.  
 International Conference on Applied Mathematics: Modeling, Analysis and Computation, Hong Kong, June 1-5, 2008.  
 The Midwest Numerical Analysis Day, Minneapolis, May 03-04, 2008.

AMS Sectional meeting at Indiana University, Bloomington, April 5-6, 2008.

(Invited speaker) SIAM Conference on Analysis of Partial Differential Equations (PD07) December 10-12, 2007, Mesa, Arizona.

(Invited speaker) Workshop on Quantized Vortices in Superfluidity and Superconductivity and Kinetic Theory. National University of Singapore, Nov. 12-16, 2007.

"Semiclassical Dynamics in Schroedinger equations: Convergence and Computation".

(Invited Speaker) International conference on Nonlinear PDEs, Beijing July 27-30, 2007.

(Invited Speaker) International conference of Industrial and Applied Mathematics (ICIAM07) Zuerich, Switzerland, July 17-20, 2007.

(Invited Speaker) International Conference on Higher-Order Methods for PDEs, Beijing, June 18-20, 2007.

(Invited Speaker) Workshop on 'Multiscale Modeling and Simulation in Complex Fluids' University of Maryland, April 15-20, 2007.

(Invited Speaker) Clifford Lecture Series workshop, Tulane University, March 20-25, 2006

(Invited Speaker) Midwest PDE conference, Iowa City, September 22-25, 2006.

(Invited speaker) 43rd Annual Technical Meeting Society of Engineering Science University Park, August 13-16, 2006.

(Invited speaker) SIAM Conference on Analysis of Partial Differential Equations Boston, July 10-12, 2006.

(Invited speaker) International conference on "Nonlinear PDEs: Homogenization and Kinetic Equations" Vienna, Austria, June 26-30, 2006.

(Invited speaker) International conference on "Recent Advances of Scientific Computing" Beijing, China, June 18-19, 2006.

(Invited speaker) AMS sectional meeting at Johnson City, TN. October 15-16, 2005.

(Invited speaker) International workshop on "High Frequency Wave propagation" at CSCAMM, University of Maryland., September 19-22, 2005.

(Invited speaker) International Conference on Scientific Computing Nanjing, China, June 4-8, 2005.

(Invited speaker) Workshop on "Computational Transport in Meso and Nano Scales" Austin, Texas. March 4-5, 2005.

(Organizer and invited speaker) SIAM Conference on Analysis of Partial Differential Equations Houston, Texas, December 6-8, 2004.

(Invited speaker) AMS Meeting on 'Partial Differential Equations and Applications' (Code: SS4) Pittsburgh, PA, November 06-07, 2004.

(Invited speaker) AMS Meeting on 'Nonlinear Partial Differential Equations and Applications' . (Code: SS 6A) Evanston, IL, October 23-24, 2004.

(Organizer) Iowa PDE/Applied Math Seminar Iowa State University, October 09, 2004.

(Invited speaker) International Conference on Nonlinear Evolution equations Zhengzhou, Henan, China, June 20-23, 2004.

(Invited speaker) International Conference on Nonlinear Evolutional PDEs Zhenjiang, Jiangsu, China, May 16-20, 2004.

(Invited speaker) Workshop on Hyperbolic Conservation Laws, Oberwolfach, Germany, April 4-10, 2004.

(Invited speaker) AMS Meeting at University of Southern California (2004 Spring Western Section Meeting), Los Angeles, CA, April 3-4, 2004.

(Invited speaker) Second Reunion Conference of IPAM's Geometrically Based Motion Program Lake Arrowhead, California, Dec. 7-12, 2003.

(Invited session speaker) The 5th International Congress on Industrial and Applied Mathematics

ICIAM 2003, Sydney, Australia, 7-11 July 2003.  
 (Organizer & invited speaker) Second M.I.T. Conference on Computational Fluid and Solid Mechanics  
 Special Session on “Recent Advances in Analysis and Numerics for Fluid Dynamics Problems”  
 Cambridge USA, June 17 - 20, 2003.  
 (Invited participant) Nonlinear Hyperbolic Waves in Phase Dynamics and Astrophysics  
 Isaac Newton Institute for Mathematical Sciences, UK; 25 May–07 June.  
 (Organizer & invited speaker) International workshop on “Analysis and Numerics  
 for Modelling Semiconductor Devices and Biological Channels”, CSCAMM, May 19-23, 2003.  
 (Organizer) Iowa PDE/Applied Math Seminar Iowa State University, April 26, 2003.  
 (Invited speaker) Emerging Applications of the Nonlinear Schrödinger Equations  
 IPAM, UCLA, Feb. 3-7 2003.  
 (Invited Speaker) The AMS Sectional Meeting, Madison, October 12-13, 2002.  
 (Invited speaker) International Workshop on Hyperbolic Problems.  
 Potsdam, Germany, September 30–October 3, 2002.  
 (Invited speaker) The IPAM GBM Reunion at Lake Arrowhead, September 16-20, 2002.  
 (Organizer & Chair) International Conference on Evolution Equation: Analysis and Applications,  
 Kaifeng, China, August 29–September 1, 2002.  
 International Conference of Mathematicians, Beijing, August 20-28, 2002.  
 (Invited Lecture) Ninth International Conference on Hyperbolic Problems,  
 Theory, Numerics, Applications, Pasadena, California, March 25-29, 2002.  
 (Invited Speaker) The 2002 UAB International Conference on Differential Equations  
 and Mathematical Physics, Birmingham, Alabama, March 26-30, 2002.  
 (Invited Speaker) The AMS Joint Mathematics Meetings, San Diego, January 6-9, 2002

### COLLOQUIUM & SEMINARS

North China University of Water Resources and Electric Power (NCWU), October 18, 2021  
 China University of Mining and Technology, June 02 28, 2020  
 China University of Mining and Technology, May 21, 2020  
 Iowa State Univ. Math Colloquium, Feb. 09, 2021.  
 University of Science of Technology, December 22, 2020.  
 China University of Mining and Technology, August 28, 2020.  
 North China University of Water Resources and Electric Power (NCWU), June 22, 2020.  
 Tianyuan Mathematical Center in Northeast China, June 13, 2020.  
 University of South Carolina, Feb. 21, 2020.  
 Computational and Applied Math (CAM) Seminar, Sept. 23, 2019.  
 ISU Theoretical and Applied Data Science (TADS) Series, Sept. 12, 2019.  
 YMSC at Tsinghua, Lecture series, July 22-25, 2019.  
 The College of honor program, Beijing Capital Normal University, July 12, 2019.  
 Institute of Computational Mathematics, Chinese Academy of Sciences, July 12, 2019.  
 China University of Mining and Technology (Beijing), July 11, 2019.  
 Southern University of Science and Technology, July 08, 2019.  
 Tianjin Normal University, July 06, 2019.  
 Xiangtan University, July 02, 2019.  
 HuaBei University of Water and Electricity, June 15, 2019.  
 Applied Mathematics Colloquium, Beijing Normal University Beijing, June 05, 2019.  
 YMSC, Tsinghua University, June 04, 2019.

Fudan University, June 03, 2019.  
 Hangzhou Normal University, June 02, 2019.  
 Applied Mathematics Colloquium, RWTH (Aachen, Germany), January 31, 2019.  
 Mathematics Colloquium, Magdeburg University (Germany), January 24, 2019.  
 Applied Mathematics Seminar, Otto-von-Guericke University (Magdeburg, Germany), December 10, 2018.  
 Applied Mathematics Seminar, CMU (Pittsburgh), November 15, 2018.  
 Applied Mathematics Seminar, UCLA (Los Angeles), November 04, 2018.  
 King Abdullah University of Science and Technology, September 19, 2018.  
 Tianjin Normal University, July 29, 2018.  
 HuaZhong University of Science and Technology, July 26, 2018.  
 Xiangtan University, July 20-21, 2018.  
 Beijing Normal University, June 1, 2018.  
 Beijing University of Technology, May 29, 2018.  
 Normal University, Beijing, May 23, 2018.  
 Capital Normal University, Beijing, May 23, 2018.  
 China University of Mining and Technology, Beijing, May 21, 2018.  
 Institute of Applied Mathematics, Chinese Academy, Beijing, May 16, 2017.  
 Tsinghua University, May 15-25, 2018.  
 HuaNan University of Technology, May 14, 2018.  
 Zhongshan University, May 11, 2018.  
 Guangzhou University, May 10, 2018.  
 Peking University Math colloquium, July 20, 2017.  
 Chiangmai University Math Colloquium, July 14, 2017.  
 Institute of Computational Mathematics, Chinese Academy, Beijing, July 09, 2017.  
 Institute of Applied Mathematics, Chinese Academy, Beijing, January 09, 2017.  
 Rash medical center, Chicago, December 27, 2016.  
 Center of Mutli-phase Flow and Education (CoMFE), Ames, October 18, 2016.  
 University of Iowa Mathematics Colloquium, Iowa City, October 13, 2016.  
 University of Arizona Applied Math Colloquium, Tucson, Arizona, September 23, 2016.  
 Institute of Applied Mathematics, Chinese Academy, Beijing, May 29, 2016.  
 Beijing Normal University Math Colloquium, Beijing, May 27, 2016.  
 Institute of Computational Mathematics, Chinese Academy, Beijing, May 26, 2016.  
 SIAM chapter at Iowa State University, Ames, Feb. 20, 2016.  
 South Methodist University Math Colloquium, Dallas, March 01, 2016.  
 University of Alabama Math Colloquium, Tuscaloosa, October 16, 2015.  
 Iowa State University Math Colloquium, October 06, 2015.  
 Institute of Applied Phys. and Computational Math, August 16, 2015.  
 Xiantan University Math Colloquium, July 10, 2015.  
 Iowa State Graduate semianr, March 25, 2015.  
 Florida International University Math Colloquium, Miami, Feb. 27, 2015.  
 University of Magdeburg, Germany, December 16, 2014.  
 Laboratoire J.-L. Lions, Universit Pierre et Marie Curie, Paris of France, November 24, 2014.  
 Nanyang University of Technology, October 30, 2014.  
 International Center of Mathematical Research, Beijing, October 29, 2014.  
 Institute of Applied Mathematics, CAS, Beijing, 2014.  
 Beijing University of Chemical Technology, October 20, 2014.

Beijing Normal University, October 10, 2014.  
 Tsinghua University, Beijing, October 09, 2014.  
 Institute of Computational Mathematics, CAS, Beijing, September 26, 2014.  
 Capital Normal University, Beijing, September 24, 2014.  
 Summer course, Beijing University of Chemical Engineering, Beijing, July 14–18, 2014.  
 Institute of Applied Mathematics, Chinese Academy, Beijing, July 18, 2014.  
 Hunan Normal University, Changsha, June 24, 2014.  
 Lecture series, Xiangtan University, Xiangtan, June 18, 2014.  
 Beijing Computational Science Research Center June 3, 2014.  
 Mathematics Colloquium, Beijing Institute of Technology June 3, 2014.  
 Mathematics Colloquium, Rutgers University New Brunswick, NJ, April 22, 2014.  
 Applied Mathematics Colloquium, University of Kansas Lawrence March 5, 2014.  
 Mathematics Colloquium, Southern Methodist University University Park, Texas, February 28, 2014.  
 Public lecture, Hunan University of Science and Technology, June 7, 2013.  
 Mathematics Colloquium, Xiangtan University, May 22, 2013.  
 Applied math seminar, Chinese Academy, Beijing, June 14, 2013.  
 Mathematics Colloquium, Zhengzhou University, June 3, 2013.  
 NCTS & CMMSC Seminar on Scientific Computation, Taiwan, January 09, 2013.  
 Applied Math Seminar, Shanghai Jiatong University, Shanghai, July 20, 2012.  
 Colloquium at Chinese Academy, June 07, 2012.  
 Mathematics Colloquium, Beijing Normal University, May 28, 2012.  
 Applied Math Lecture series at Center of Mathematics, Tsinghua University, May 7–June 15, 2012.  
 CFD seminar series, Iowa State University, January 30, 2012.  
 CSCAMM seminar, University of Maryland, College Park, November 02, 2011  
 Applied Math Seminar, Chinese Academy, Beijing, July 13, 2011  
 Math colloquium, Tsinghua University, Beijing, July 12, 2011  
 Math colloquium, University of Pittsburgh, February 11, 2011.  
 National Central University, Taiwan, January 06, 2011  
 National Taiwan University, Taipei, December 31, 2010.  
 Tunghai University, Taiwan, December 29, 2010.  
 Math colloquium, University of Iowa, Iowa city, December 03, 2010.  
 Center for Nonlinear Analysis, CMU, November 18, 2010.  
 Iowa State University, September 07, 2010.  
 Hunan Normal University, Changsha, June 29, 2010.  
 Institute of Applied Mathematics, Beijing, June 21, 2010.  
 Shanghai Jiaotong University, June 04, 2010.  
 Math Colloquium at California State University, Northridge, May 05, 2010.  
 Computational and Applied Mathematics seminar, ISU, January 31, 2010.  
 Computational and Applied Mathematics seminar, ISU, November 02, 2009.  
 Mathematics Colloquium, University of Iowa, October 28, 2009.  
 Institute of Applied Physics and Computational Mathematics (IAPCM), Beijing, August 18, 2009.  
 Department of Mathematics, Zhengzhou University, China, August 8, 2009.  
 Institute of Mathematics and Systems Sciences, Chinese Academy, July 30, 2009.  
 Institute of Computational Mathematics (ICM), Chinese Academy, July 30, 2009.  
 IPAM seminar series, UCLA, Los Angeles, May 29, 2009.  
 UCI PDE seminar, UC Irvine, May 28, 2009.

UC San Diego Applied Math Colloquium, San Diego, May 12, 2009.  
 UCLA Level Set Collective seminar, Los Angeles, February 03, 2009.  
 The Center of Advanced Study, Norwegian Academy of Sciences, Oslo, December 18, 2008.  
 Department of Numerical Mathematics, KTH, Sweden, December 04, 2008.  
 The Graduate Colloquium at Department of Mathematics, ISU, Ames, November 12, 2008.  
 Applied Math Colloquium, CSCAMM, University of Maryland, College Park, October 15, 2008.  
 Colloquium; Department of Mathematics, Georgetown University, Washington DC. October 08, 2008.  
 Institute of Applied Math, Academic Sinica, Beijing, July 10, 2008.  
 Department of Mathematics, Beijing University of Technology and Chemical, Beijing, July 08, 2008.  
 Department of Mathematics, Tianjin Normal University, Tianjin, July 04, 2008.  
 North China University of Water Conservancy and Electric Power, Zhengzhou, June 22, 2008.  
 Institute of mathematics and physics in Wuhan, Chinese Academy, June 16, 2008.  
 Department of Mathematics, Macau University, Macau, June 9, 2008.  
 Department of Mathematics, Hunan Normal University, Changsha, June 12, 2008.  
 Department of Mathematics, The Baptist University of Hong Kong, June 6, 2008.  
 The institute of Mathematical Sciences, Chinese University of Hong Kong, May 28, 2008.  
 The CFD lecture series at the ISU CFD center, April 08, 2008.  
 Applied Math Colloquium, Penn State University, March 28, 2008.  
 Applied math /PDE seminar, University of Wisconsin-Madison, Feb. 25, 2008.  
 Graduate colloquium, Department of Math, ISU, December 05, 2007.  
 Zhengzhou University, August 15, 2007. Fudan University, Shanghai, August 05, 2007.  
 Beijing University of Chemical Technology, August 02, 2007.  
 Beijing Institute of Technology (BIT), lecture series (4 lectures) July 25-July 31, 2007.  
 Institute of Computation and LSEC, Academia sinica, Beijing, July 26, 2007.  
 University of Magdeburg, Institute of analysis and numerics, Germany, July 12, 2007.  
 University of Stuttgart, Center of Applied Math, Germany, July 16, 2007.  
 University of Toulouse, Mathematics for Industry and Applications, France, June 11, 2007.  
 University of Vienna, Department of Math, Austria, May 26-June 3, 2007.  
 Department of Math, UCSD, March 11-14, 2007.  
 Department of Math, University of Missouri at Columbia, November 16, 2006.  
 PWI, Vienna University, Vienna, June 25, 2006.  
 Tsinghua University, Beijing, May 31, 2006.  
 Institute of Computational Math, Beijing, May 25, 2006.  
 Department of Math, ISU, April 11, 2006.  
 The Ames Laboratory (a USDOE facility), December 13, 2005.  
 Department of Math, University of Wisconsin at Madison, September 16, 2005  
 Department of Mathematics, Ohio State University, April 21, 2005.  
 Institute of Applied Physics and Computational Mathematics, Beijing, June 16, 2005.  
 Department of Mathematics, Capital Normal University, June 15, 2005.  
 Department of Mathematics, Zheng Zhou University, June 09, 2005.  
 Department of mathematics, Penn State University, April 04, 2005.  
 Institute of Mathematics and Applications, IMA, March 09, 2005.  
 Department of Mathematics, Georgia Institute of Technology, March 01, 2005.  
 Institute of Mathematics and Applications (IMA), February 1, 2005.  
 Applied Math. Colloquium, Department of Math, University of Iowa, November 18, 2004.  
 Institute of Mathematics, CAS, Beijing, July 19, 2004.



Beijing University of Chemical Engineering, Beijing, July 16, 2004.  
 Institute of Computational Mathematics, CAS, Beijing, July 13, 2004.  
 Beijing Normal University, Beijing, July 09, 2004.  
 Zhengzhou University, Zhengzhou, June 26, 2004.  
 Zhejiang University, Hangzhou, June 6, 2004.  
 Fudan University, Shanghai, May 28, 2004.  
 Southeastern University, May 21, 2004.  
 Shanghai Normal University Colloquium, Shanghai, May 14, 2004.  
 Shanghai Jiaotong University, Shanghai, May 12, 2004.  
 Northwestern University PDE seminar, Evanston, Feb. 25, 2004.  
 CSCAMM Summer Program at University of Maryland, June 24, 2003.  
 Isaac Newton Institute for Mathematical Sciences, UK; 25 May–07 June, 2003.  
 CSCAMM Colloquium at University of Maryland, May 14, 2003.  
 Applied Mathematics Seminar at Penn State University, April 7, 2003.

## **ORGANIZING COMMITTEES OF MINI-SYMPOSIA, WORKSHOPS, AND CONFERENCES** \_\_\_\_\_

(Lead organizer) Iowa PDE Seminar, Iowa State University, October 30, 2021.  
 (Co-organizer) SIAM Central States Session Conference – Recent advances in high order numerical methods for PDEs, University of Kansas, October 2–3, 2021.  
 (Lead Organizer) AIM (American Institute of Mathematics) SQuaREs research collective on PDE based Analysis for Deep Learning” (2020-2023)  
 (Co-organizer) Mini-symposia at SIAM Conference on Mathematics of Data Science, Cincinnati, Ohio, May 5-8, 2020.  
 (Co-organizer) The 5th annual meeting of SIAM Central States Section. Ames, October 19–20, 2019.  
 (Co-organizer) Workshop on PDE modeling and analysis in Bioscience and complex media. International Mathematics Forum at Sanya, July 29–August 03, 2019.  
 (Organizer) Mathematics and Deep Learning Collective, KAUST, April 08–May 27, 2019.  
 (Co-organizer) SIAM Central States Session Conference – Recent advances in high order numerical methods for PDEs, The University of Oklahoma, October 6–7, 2018.  
 (Organizer) KI-Net workshop on critical threshold phenomena, April 20-22, 2018.  
 (Organizer) Workshop on Computational and Applied Mathematics, Tsinghua University, Beijing, December 03, 2017.  
 (Organizer) Workshop on Computational and Applied Mathematics, Beijing Normal University, July 08, 2017.  
 (Organizer) NSF-supported Ki-Net Conference “Kinetic Descriptions of Chemical and Biological Systems: Models, Analysis and Numerics” Iowa State University, March 23–25, 2017.  
 (Organizer) International Workshop on “Mathematical frontier issues in materials science”, Zhengzhou University, January 5-8, 2017.  
 (Organizer) Workshop on Computational and Applied Mathematics, Tsinghua University, Beijing, May 28, 2016.  
 (Mini-symposium organizer) SIAM Conference on Analysis of PDEs: “Structure preserving methods for kinetic and wave equations”, Scottsdale, December 6-10, 2015.  
 (Organizer) Workshop on Computational and Applied Mathematics, Beijing, July 4th, 2015.

(Organizer) SIAM Central States Annual Meeting, Rolla, April 10-12, 2015.

Iowa PDE conference, Ames, March 28, 2015.

(Organizer) Workshop in Computational and Applied Mathematics, Beijing, September 20, 2014.

(Organizer) NSF-supported Ki-Net Summer School “Dynamics and Numerics for Non-local PDEs and Related Equations in the Physical and Biological Sciences” Iowa State University, 4-7 May, 2014.

(Organizer) Modern Perspectives in Applied Mathematics: Theory and Numerics of PDEs, in honor of Prof. Tamdor’s 60th birthday, April 28-May 02, 2014.

(Organizer) Beijing Seminar in Computational and Applied Mathematics, Beijing, June 15, 2013.

(Organizer) Kinetic research team on “Research on Kinetic Theory of Photons (II)”, Ames, April 27–30, 2013.

(Organizer) AMS special session on “Kinetic and hydrodynamic PDE-based descriptions of multi-scale phenomena”, Ames, Apr 27 - 28, 2013.

(Organizer) AMS special session on “Numerical Analysis and Scientific Computing”, Ames, April 27–28, 2013.

(Organizer) Workshop on Kinetic PDEs: Analysis and Computation, ISU, April 25-26, 2013.

(Organizer) Workshop on numerical PDEs, Taiwan, December 24, 2012.

(Organizer) KI-Net workshop on “Kinetic theory and molecular modeling”, Ames, October 20-21, 2012.

(Organizer) SQuaRE research week on high frequency waves in American Institute of Mathematics, 13-17 August, 2012.

(Organizer) Kinetic Interaction Week in University of Maryland, July 30–August 03, 2012.

(Organizer) Computational and Applied Mathematics CAM day at Tsinghua University, June 02, 2012.

(Organizer) The Mathematics Distinguished Lecture Series, Ames, May 02-07, 2011.

(Organizer) The Iowa PDE workshop, ISU, May 07, 2011.

(Mini-symposium organizer) AMS sectional meeting at Iowa city, March 18–20, 2011.

(Organizer) The IMA participating workshop “Midwest Numerical Analysis Day”, Ames, IA, April 24-25, 2010.

(Organizer) The Iowa PDE workshop, ISU, October 10, 2009.

(Organizer) Mini-symposium at the SIAM PDE analysis conference, Miami, December 7–10, 2009. “MS4: Kinetic Description, Hyperbolic Dynamics, and Wave Propagation - Part I of IV.”

(Organizer and Co-Chair) The IMA participating workshop on “Computational and Mathematical Aspects of Materials and Fluids”, Iowa State University, April 13–14, 2007.

(Organizer and Co-Chair) The ISU workshop “Computational Methods and Applied Partial Differential Equations”, November 4-5, 2005.

(Organizer of a mini-symposium) SIAM Conference on “Analysis of Partial Differential Equations”, Houston, Texas, December 6-8, 2004.

(Organizer and invited speaker) Second M.I.T. Conference on “Computational Fluid and Solid Mechanics, Special Session on “Recent Advances in Analysis and Numerics for Fluid Dynamics Problems”, Cambridge USA, June 17 - 20, 2003.

(Organizer and invited speaker) International workshop on “Analysis and Numerics for Modeling Semiconductor Devices and Biological Channels”, CSCAMM, May 19-23, 2003.

(Organizer) Iowa PDE/Applied Math Seminar, Iowa State University, April 26, 2003.

## SUMMARY (October 2021)

Hailiang Liu  
Professor in Mathematics  
Iowa State University

Dr. Hailiang Liu is currently a Professor of Mathematics and Computer Science at the Iowa State University (ISU). He received his BS degree in Mathematics in 1984 from Henan Normal University in China, his MS degree in Applied Mathematics in 1988 from Tsinghua University, and his PhD degree in 1995 from the Chinese Academy; while he held professor positions at Henan Normal University from 1989-1996. He received an Alexander von Humboldt-Research Fellowship in 1996 that allowed him to conduct research in Germany from 1997-1999. From 1999–2002 he worked as CAM (Computational and Applied Math) Assistant Professor at UCLA. He then joined Iowa State University as an Associate Professor in 2002, moving up to Full Professor in 2007. His research work has been awarded over 20 research grants from such sponsors as CNSF, DFG, NSF DOE-Lab, and PSI. The research topics include analysis of time-dependent partial differential equations, the development of stable, accurate approximate algorithms for these problems, and the interplay between analytical theory and computational aspects of such algorithms with applications to shock waves, polymers, hyperbolic relaxation, level set closure, propagation of critical thresholds and recovery of high frequency wave fields.

Liu's research group at ISU has reported its research findings in more than 140 published papers, mostly in Numerical Analysis and Applied Partial Differential Equations. He has chaired or organized more than 40 workshops or special sessions in domestic and international conferences. He was the first recipient of the Dio Lewis Holl Chair in Applied mathematics in 2002, and he was also the recipient of the 2009 ISU Award for Mid-Career Achievement in Research, and the 2019 LAS Award for Outstanding Achievement in Research. At UCLA he was the recipient of the 2002 Robert Sorgenfrey Distinguished Teaching Award.

Liu serves on the editorial board of the JMAA and JMAC journals, and has given more than 180 invited lectures, including the invited address in the international conference on hyperbolic problems in 2002 and 2018. Liu has supervised and graduated 12 PhD students and 5 MS students, and 5 post-docs, with 4 graduate students currently in his research group at ISU.