

Ruiwen Shu – Curriculum Vitae

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Education

- 2018-present** Serguei Novikov Postdoctoral Fellowships - Department of Mathematics, University of Maryland, College Park
Mentor: Prof. Eitan Tadmor
- 2014-2018** PhD - Department of Mathematics, University of Wisconsin-Madison
Major: Mathematics
Advisor: Prof. Shi Jin
- 2010-2014** Bachelor of Mathematics - School of Mathematical Sciences, Peking University
Major: Mathematics

Honors and awards

- Nov 2017** **Excellence in Research Award** (UW-Madison)
for significant and substantial contributions to research in mathematics
- July 2013** **Bronze Medal, L. -K. Hua Awards (Analysis)**
S.-T. Yau College Student Mathematics Contests
(Gold/Silver/Bronze=1/3/6)
- Oct 2013** **Huirong Li Scholarship** (Peking University)
- Oct 2012** **Wengang Li Scholarship** (Peking University)
- Oct 2011** **Wusi Scholarship** (Peking University)
- Sept 2010** **Outstanding Freshman Scholarship** (Peking University)
- July 2009** **Silver Medal**, National Olympiad in Informatics (China)

Research interest

My research interests include energy minimization problems and related gradient flows, collective dynamics, numerical methods for kinetic and hyperbolic problems, and uncertainty quantification.

Publications

[19] Douglas P. Hardin, Edward B. Saff, Ruiwen Shu and Eitan Tadmor, *Dynamics of Particles on a Curve with Pairwise Hyper-singular Repulsion*, preprint, arXiv:2010.05431.

[18] Ruiwen Shu and Eitan Tadmor, *Newtonian repulsion and radial confinement: convergence towards steady state*, preprint, arXiv:2009.13063.

[17] Ruiwen Shu, *Tightness of radially-symmetric solutions to 2D aggregation-diffusion equations with weak interaction forces*, preprint, arXiv:2006.01955.

[16] Ruiwen Shu, *Equilibration of aggregation-diffusion equations with weak interaction forces*, preprint, arXiv:2003.04230.

- [15] Jingwei Hu and Ruiwen Shu, *On the uniform accuracy of implicit-explicit backward differentiation formulas (IMEX-BDF) for stiff hyperbolic relaxation systems and kinetic equations*, Mathematics of Computation, to appear.
- [14] Shi Jin and Ruiwen Shu, *Collective dynamics of opposing groups with stochastic communication*, Vietnam Journal of Mathematics, 2020: 1-18.
- [13] Ruiwen Shu and Eitan Tadmor, *Anticipation breeds alignment*, preprint, arXiv:1905.00633.
- [12] Jingwei Hu, Shi Jin and Ruiwen Shu, *On stochastic Galerkin approximation of the nonlinear Boltzmann equation with uncertainty in the fluid regime*, J. Comput. Phys., 397: 108838, 2019.
- [11] Ruiwen Shu and Eitan Tadmor, *Flocking hydrodynamics with external potentials*, Archive for Rational Mechanics and Analysis, 2020: 1-35.
- [10] Shi Jin and Ruiwen Shu, *A study of hyperbolicity of kinetic stochastic Galerkin system for the isentropic Euler equations with uncertainty*, Chinese Annals of Mathematics, Series B, 40(5), 765-780, 2019.
- [9] Jingwei Hu and Ruiwen Shu, *A second-order asymptotic-preserving and positivity-preserving exponential Runge-Kutta method for a class of stiff kinetic equations*, SIAM Multiscale Model. Simul., 17(4): 1123-1146, 2019.
- [8] Ruiwen Shu and Shi Jin, *A study of Landau damping with random initial inputs*, J. Differ. Equat., 266(4), 1922-1945, 2019.
- [7] Jingwei Hu, Ruiwen Shu and Xiangxiong Zhang, *Asymptotic-preserving and positivity-preserving implicit-explicit schemes for the stiff BGK equation*, SIAM J. Numer. Anal., 56(2), 942-973, 2018.
- [6] Qin Li, Jian-Guo Liu and Ruiwen Shu, *Sensitivity analysis of Burgers' equation with shocks*, SIAM/ASA J. Uncertainty Quantification, to appear, arXiv:1708.04332.
- [5] Qin Li, Ruiwen Shu and Li Wang, *A new numerical approach to inverse transport equation with error analysis*, SIAM J. Numer. Anal., SIAM J. Numer. Anal., 56(6), 3358-3385, 2018.
- [4] Ruiwen Shu and Shi Jin, *Uniform regularity in the random space and spectral accuracy of the stochastic Galerkin method for a kinetic-fluid two-phase flow model with random initial inputs in the light particle regime*, ESAIM Math. Model. Numer. Anal., 52(5), 1651-1678, 2018.
- [3] Jingwei Hu, Shi Jin and Ruiwen Shu, *A stochastic Galerkin method for the Fokker-Planck-Landau equation with random uncertainties*, Proc. 16th Int'l Conf. on Hyperbolic Problems, pp. 1-19, 2016.
- [2] Ruiwen Shu, Jingwei Hu and Shi Jin, *A Stochastic Galerkin Method for the Boltzmann Equation with multi-dimensional random inputs using sparse wavelet bases*, Numer. Math. Theor. Meth. Appl. (NMTMA) 10, 465-488, 2017. (A special issue in honor of the 80th birthday of Prof. Zhenhuan Teng)
- [1] Shi Jin and Ruiwen Shu, *A stochastic Asymptotic-Preserving scheme for a kinetic-fluid model for disperse two-phase flows with uncertainty*, J. Comput. Phys., 335, 905-924, 2017.

Invited conference talks

- 2020 Mar** International Workshop on Interacting Particle Systems, SJTU, China
- 2019 Dec** SIAM PD19, La Quinta, CA
- 2019 Oct** Young Researchers Workshop: Ki-Net 2012-2019, University of Maryland, College Park
- 2019 July** SciCADE 2019, Innsbruck, Austria
- 2019 June** Young Researcher Workshop on Uncertainty Quantification and Machine Learning, SJTU, China
- 2019 Mar** Mathematical Aspects of Collective Dynamics: Kinetic Description and Fractional Diffusion, University of Maryland, College Park
- 2018 Nov** Multiscale Computations for Kinetic and Related Problems, North Carolina State University
- 2018 Oct** Young Researchers Workshop: Kinetic descriptions in theory and applications, University of Maryland, College Park
- 2018 Feb** Young Researchers Workshop: Kinetic models in biology and social sciences, Arizona State University
- 2017 Oct** Hypocoercivity and Sensitivity Analysis in Kinetic Equations and Uncertainty Quantification, UW-Madison
- 2017 July** International Conference on Uncertainty Quantification in Computational Fluid Dynamics, SJTU, China
- 2017 Feb** 2017 SIAM Conference on Computational Science and Engineering, Atlanta, GA

Contributed conference talks

- 2019 July** ICIAM 2019, Valencia, Spain
- 2016 Aug** XVI International Conference on Hyperbolic Problems, Aachen, Germany

Attended conferences and summer schools

- 2018 June** International workshop on Kinetic Theory and Related Topics, TSIME, China
- 2018 Mar** Workshop on kinetic and fluid Partial Differential Equations, Univ. Paris Descartes and Univ. Paris Diderot, France
- 2017 July** Summer School on Applied and Stochastic Analysis for Partial Differential Equations, SJTU, China
- 2017 Apr** Pre-School on Stochastic Dynamics out of Equilibrium, CIRM, France
- 2017 Jan** IPAM Big Data Meets Computation Program, UCLA
- 2016 July** Conference on Quantum and Kinetic Transport, SJTU, China
- 2016 June** Summer School on Quantum and Kinetic Theory for Complex Systems, UCSB
- 2016 Apr** Boundary Value Problems and Multiscale Coupling Methods for Kinetic Equations, UW-Madison
- 2016 Feb** Advances in Kinetic and Fluid Dynamics Transport: Analysis and Approximations, UT-Austin
- 2015 Nov** Young Researchers Workshop: Kinetic Theory with Applications in Physical Sciences, CSCAMM
- 2015 May** Asymptotic Preserving and Multiscale Methods for Kinetic and Hyperbolic Problems, UW-Madison

Teaching (as instructor, at UMCP)

Fall 2020-2021	Math 246 (Introduction to ODEs)
Spring 2019-2020	AMSC 460 (Numerical methods)
Fall 2019-2020	AMSC 460 (Numerical methods), 2 sections
Spring 2018-2019	Math 136 (Calculus for life sciences)
Fall 2018-2019	Math 141 (Calculus 2)

Teaching (as teaching assistant, at UW-Madison)

Fall 2017-2018	Math 234 (Calculus 3)
Fall 2016-2017	Math 222 (Calculus 2)
Fall 2015-2016	Math 234 (Calculus 3)
Spring 2014-2015	Math 221 (Calculus 1)
Fall 2014-2015	Math 221 (Calculus 1)