

# Zheng Sun

Department of Mathematics  
The University of Alabama  
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## Education

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- **Brown University, RI, USA**

Ph.D. in Applied Mathematics, Division of Applied Mathematics. 08/2014 – 05/2018  
Advisor: Prof. Chi-Wang Shu.

M.Sc. in Applied Mathematics, Division of Applied Mathematics. 08/2014 – 05/2015

- **University of Science and Technology of China, Anhui, China**

B.Sc. in Mathematics and Applied Mathematics, 09/2010 – 07/2014  
School of the Gifted Young.  
Advisor: Prof. Falai Chen.

## Professional Experience

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- **The University of Alabama, AL, USA**

Assistant Professor, Department of Mathematics. 08/2021 – Present

- **The Ohio State University, OH, USA**

Visiting Assistant Professor, Department of Mathematics. 08/2018 – 08/2021  
Mentor: Prof. Yulong Xing.

- **Oak Ridge National Laboratory, TN, USA**

Intern, Computer Science and Mathematics Division. Summers, 2017 & 2018  
Mentor: Dr. Cory Hauck.

## Honors and Awards

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- SIAM Early Career Travel Award. 2019 & 2021
- New World Mathematics Award, Honorable Mention of Doctoral Thesis. 2018
- David Gottlieb Memorial Award, Brown University. 2018
- Selectee of NSF Mathematical Sciences Graduate Internship Program. 2017
- China National Scholarship. 2011, 2012 & 2013

## Publications in and Submissions to Refereed Journals

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### Preprint

11. Z. Sun and C.-W. Shu, Error analysis of Runge–Kutta discontinuous Galerkin methods for linear time-dependent partial differential equations. <https://arxiv.org/abs/2001.00971>

### Appeared or Accepted

10. Z. Sun and C.-W. Shu, Enforcing strong stability of explicit Runge–Kutta methods with superviscosity, *Communications on Applied Mathematics and Computation*, to appear.
9. Z. Sun, S. Wang, L.-B. Chang, Y. Xing and D. Xiu, Convolution neural network shock detector for numerical solution of conservation laws, *Communications in Computational Physics*, v28 (2020), pp.2075–2108.
8. Z. Sun and Y. Xing, Optimal error estimates of discontinuous Galerkin methods with generalized fluxes for wave equations on unstructured meshes, *Mathematics of Computation*, v90 (2021), pp.1741–1772.
7. Z. Sun and Y. Xing, On structure-preserving discontinuous Galerkin methods for Hamiltonian partial differential equations: Energy conservation and multi-symplecticity, *Journal of Computational Physics*, v419 (2020), 109662.
6. Z. Sun and C.D. Hauck, Low-memory, discrete ordinates, discontinuous Galerkin methods for radiative transport, *SIAM Journal on Scientific Computing*, v42 (2020), pp.B869–B893.
5. Z. Sun and C.-W. Shu, Strong stability of explicit Runge–Kutta time discretizations, *SIAM Journal on Numerical Analysis*, v57 (2019), pp.1158–1182.
4. Z. Sun, J.A. Carrillo and C.-W. Shu, An entropy stable high-order discontinuous Galerkin method for cross-diffusion gradient flow systems, *Kinetic and Related Models*, v12 (2019), pp.885–908.
3. Z. Sun, J.A. Carrillo and C.-W. Shu, A discontinuous Galerkin method for nonlinear parabolic equations and gradient flow problems with interaction potentials, *Journal of Computational Physics*, v352 (2018), pp.76–104.
2. Z. Sun and C.-W. Shu, Stability of the fourth order Runge–Kutta method for time-dependent partial differential equations, *Annals of Mathematical Sciences and Applications*, v2 (2017), pp.255–284.
1. Z. Sun and C.-W. Shu, Stability analysis and error estimates of Lax–Wendroff discontinuous Galerkin methods for linear conservation laws, *ESAIM: Mathematical Modelling and Numerical Analysis*, v51 (2017), pp.1063–1087.

## Talks and Presentations

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### Invited talks at department seminars/colloquia

9. Online colloquium, Department of Mathematical Sciences, Florida Institute of Technology, 03/18/2021.
8. Online CAM seminar, Computer Science and Mathematics Division, Oak Ridge National Laboratory, 03/11/2021.
7. Online seminar, School of Mathematical Sciences and Statistics, University of Texas Rio Grande Valley, 03/10/2021.
6. Online colloquium, Department of Mathematics, The University of Alabama, 01/26/2021.
5. Online seminar, Department of Mathematical Sciences, Michigan Technological University, 12/07/2020.
4. Online seminar, Department of Mathematics, National University of Singapore, 12/01/2020.
3. Online seminar, Mathematics Department, Western Connecticut State University, 11/15/2020.
2. Online seminar, Department of Mathematical Sciences, Korea Advanced Institute of Science and Technology, 10/14/2020.
1. CAM seminar, Computer Science and Mathematics Division, Oak Ridge National Laboratory, 06/27/2019.

#### **Invited talks at conference minisymposia**

8. Minisymposium on *Advances in Memory Efficient Numerical Algorithms for Kinetic Problems*, organized by Stefan Schnake, SIAM Southeastern Atlantic Section Meeting, Auburn, AL, 09/2021.
7. Minisymposium on *Modeling and numerical methods for coupled PDE systems*, organized by Xiaoming He and Xiaofeng Yang, SIAM Southeastern Atlantic Section Meeting, Auburn, AL, 09/2021.
6. Minisymposium on *Recent advances on discontinuous Galerkin finite element methods: analysis and computation*, organized by Zheng Sun and Yulong Xing, online, 03/04/2021.
5. Minisymposium on *Stable and Efficient Time Integration Schemes for Conservation Laws and Related Models*, organized by Philip Öffner and Hendrik Ranocha, online, 07/09/2020.
4. Minisymposium on *Structure Preserving Numerical Methods for Gradient Flow Equations*, organized by Jingwei Hu and Erlend S. Riis, 2019 SIAM Conference on Analysis of Partial Differential Equations, La Quinta, CA, 12/11/2019.
3. Minisymposium on *Recent Developments of Discontinuous Galerkin Finite Element Methods*, organized by Jue Yan and Yang Yang, 2019 SIAM Central States Section Meeting, Ames, IA, 10/19/2019.
2. Minisymposium on *Recent Advances in Discontinuous Galerkin Methods for Partial Differential Equations*, organized by Ziyao Xu, 2019 SIAM Conference on Computational Science and Engineering, Spokane, WA, 02/28/2019.
1. Minisymposium on *Recent Advances in Finite Element Methods for Partial Differential Equations*, organized by Yukun Li and Yulong Xing, 2018 AMS Spring Central Sectional Meeting, Columbus, OH, 03/17/2018.

## Contributed talks at conference minisymposia

3. 2021 Spring Finite Element Circus, online, 04/09/2021.
2. 2019 SIAM Great Lakes Section Meeting, Ann Arbor, MI, 04/27/2019.
1. 2019 Spring Finite Element Circus, West Lafayette, IN, 03/22/2019.

## Other presentations

2. Poster presentation, ORNL Summer Poster Sessions, Oak Ridge National Laboratory, Oak Ridge, TN, 08/08/2017.
1. Seminar talk, Brown Applied Math Graduate Student Seminar, Brown University, Providence, RI, 05/01/2017.

## Mentoring Experiences

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### Co-advised with Prof. Yulong Xing at The Ohio State University

#### *Undergraduate students*

- Mr. Pedro F. Gonzalez-Medina (University of Puerto Rico) SU 2021  
Ms. Yushan Qu (The Ohio State University)  
Ms. Siwei Xu (Emory University)  
Project: Machine learning of flocking phenomenon.  
Graduate assistants: Mr. Joseph Hunter and Mr. Wei-Hung Su.
- Mr. Qifan Chen (The Chinese University of Hong Kong) SU 2020  
Project: Fourier analysis for discontinuous Galerkin methods.  
Project presented at 2020 Young Mathematicians Conference.

#### *Master student*

- Mr. Joseph Hunter (The Ohio State University) 2020 – 2021

## Teaching Experiences

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### The University of Alabama (Instructor)

1. MATH 301, Discrete Mathematics AU 2021

### The Ohio State University (Instructor)

7. MATH 2415, Ordinary and Partial Differential Equations (online) SP 2021  
(58 students, 4.67/5)
6. MATH 2177, Mathematical Topics for Engineers. (online) SP 2021  
(68 students, 4.36/5)
5. MATH 2415, Ordinary and Partial Differential Equations (online) AU 2020  
(54 students, 4.46/5)

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| 4. MATH 2568, Linear Algebra<br>(Session I: 60 students, 4.18/5; Session II: 60 students, 4.30/5) | SP 2020 |
| 3. MATH 2415, Ordinary and Partial Differential Equations<br>(56 students, 4.54/5)                | AU 2019 |
| 2. MATH 2177, Mathematical Topics for Engineers<br>(94 students, 3.98/5)                          | SP 2019 |
| 1. MATH 2415, Ordinary and Partial Differential Equations<br>(42 students, 4.03/5)                | AU 2018 |

### **Brown University (Teaching Assistant)**

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| 2. APMA 0160, Introduction to Scientific Computing     | SP 2016 |
| 1. APMA 1690, Computational Probability and Statistics | AU 2015 |

## **Professional Services**

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### **Journal referee**

- *Acta Applicandae Mathematicae*
- *Calcolo*
- *Communications on Applied Mathematics and Computation*
- *Computational and Applied Mathematics*
- *IMA Journal of Numerical Analysis*
- *Journal of Computational Physics*
- *Journal of Scientific Computing*
- *Mathematics of Computation*
- *Numerische Mathematik*
- *Science China Mathematics*
- *SIAM Journal on Numerical Analysis*

### **Co-organizer of conference minisymposia**

- With Prof. Xiangxiong Zhang, *Recent developments in high order numerical methods for partial differential equations*, AMS Spring Central Sectional Meeting, West Lafayette, IN, 03/2022.
- With Prof. Yulong Xing, *Recent advances on discontinuous Galerkin finite element methods: analysis and computation*, SIAM CSE conference, Fort Worth, TX, 03/04/2021.

## **Computer Skills**

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- Programming Languages: Fortran, MATLAB, Mathematica, C/C++ and Python.

- Software and Packages:  $\LaTeX$ , ParaView, FEniCS, NGSolve, PETSc, etc.

## Memberships of Professional Societies

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- Society for Industrial and Applied Mathematics (SIAM) 2017 – Present
- American Mathematical Society (AMS) 2015 – Present