Shiping Zhou

Department of Mathematics and Statistics
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Education

- **Ph.D. Candidate in Computational and Applied Mathematics**
  Missouri University of Science and Technology (expected graduation: 2024).
  Advisor: Prof. Yanzhi Zhang
- **M.S. in Computational Mathematics**
  Shandong University, China (2019)
  Advisor: Prof. Fuzheng Gao
- **B.S. in Mathematics and Applied Mathematics**
  Anhui University of Technology, China (2016)

Research Interests

- Modeling and simulation for nonlocal models
- Finite difference methods and spectral methods
- Finite element methods
- Data-driven modeling and simulation
- Deep neural network for solving PDEs

Academic Experience

- **Missouri University of Science and Technology, Rolla, MO**
  Graduate Research/Teaching Assistant 2019 – 2024
  Department of Mathematics and Statistics
- **Oak Ridge National Laboratory, Oak Ridge, TN**
  Sustainable Research Pathways Summer Internship 2023/5 - 2023/7
  Computing and Computational Sciences Directorate (CCSD)
  Mentor: Dr. Olena Burkovska
  Studied combining neural networks and traditional numerical methods for learning nonlocal kernels.

Professional Certificates

- **Oak Ridge Leadership Computing Facility (OLCF) Hands-On HPC**
  Oak Ridge National Laboratory 2023/7

Awards

- First place at the Pi Day Celebration Poster Session, Missouri University of Science and Technology, 2023
- Graduate Education Travel Fund, Missouri University of Science and Technology, 2023
- Paul W. Eloe Graduate Research Award, Missouri University of Science and Technology, 2022 & 2023
- Nonlocal School on Fractional Equations (NSFE) Travel Award, 2022
- Mathematics and Statistics Alumni Endowed Scholarship, Missouri University of Science and Technology, 2022
- Gaoxiong Gan Scholarship Fund, Missouri University of Science and Technology, 2022, 2023 & 2024
- 7th Annual Meeting of SIAM Central State Section Travel Award, 2022

Publications and Preprints

1. *Rational spectral methods for the spatial fractional viscoacoustic wave equations*, S. Zhou, Y. Wu, and Y. Zhang, in preparation (2023).
2. *Data-driven approach for the solutions of time-dependent PDEs using convolutional neural network*, S. Zhou, Y. Li, and Y. Zhang, to be submitted (September 2023).
3. *Fast finite difference methods for variable-order fractional Laplacian*, S. Zhou, and Y. Zhang, to be submitted (September 2023).
4. *Analytical and computational aspects of the high-order fractional Laplacian*, J.P. Borthagaray, Y. Wu, S. Zhou, and Y. Zhang, preprint(2023).
5. *Fourier pseudospectral methods for the spatial variable-order fractional wave equations*, S. Zhou, X. Zhao, and Y. Zhang, (2023), submitted.
6. *A novel and simple spectral method for nonlocal PDEs with the fractional Laplacian*, S. Zhou and Y. Zhang, (2023) submitted.
7. *Weak Galerkin finite element method with second-order accuracy in time for parabolic problems*, S. Zhou, F. Gao, B. Li, and Z. Sun, Appl. Math. Lett., 90 (2019), pp. 118-123.

Presentations

1. Invited talk: *A novel and simple spectral method for nonlocal PDEs with fractional Laplacian.* The 8th Annual Meeting of SIAM Central States Section, Lincoln, NE, 2023/10.

2. Poster: *Machine learning of nonlocal kernels.* Sustainable Research Pathways End of Summer Lighting Talks, Sustainable Horizons Institute & Oak Ridge National Laboratory, Online, 2023/8.

3. Seminar talk: *Machine learning of nonlocal kernels.* Summer Student Presentations, Oak Ridge National Laboratory, Oak Ridge, TN, 2023/7.

4. Poster: *Machine learning of nonlocal kernels.* Sustainable Research Pathways Midterm Lighting Talks, Sustainable Horizons Institute & Oak Ridge National Laboratory, Online, 2023/7.

5. Seminar talk: *A novel and simple spectral method for nonlocal PDEs with fractional Laplacian.* Graduate Seminar at Missouri University of Science and Technology, Rolla, MO, 2023/4.

6. Poster: *Numerical studies on the high-order fractional Laplacian.* Pi Day at Missouri University of Science and Technology, Rolla, MO, 2023/3.

7. Seminar talk: *Accurate and efficient spectral method for fractional wave equations.* Numerical Analysis Seminar at University of Pittsburgh, Pittsburgh, PA, 2023/2.

8. Invited talk: *Accurate and efficient spectral method for fractional wave equations.* The 7th Annual Meeting of SIAM Central States Section, Stillwater, OK, 2022/10.

9. Poster: *Numerical studies on the high-order fractional Laplacian.* Theoretical and Applied Aspects for nonlocal Models - Workshop of Banff International Research Station (BIRS), Online, 2022/7.

10. Seminar talk: *Numerical Methods for acoustic wave equations.* Graduate Seminar at Missouri University of Science and Technology, Rolla, MO, 2022/4.

11. Poster: *Numerical studies on the high-order fractional Laplacian.* The University of Kansas Numerical Analysis Day 2022, Lawrence, KS, 2022/3.

12. Seminar talk: *Numerical studies on the high-order fractional Laplacian.* Continuum Mechanics Seminar at University of Nebraska-Lincoln, Online, 2022/3.

13. Invited talk: *Numerical studies on the high-order fractional Laplacian.* 4th Annual Meeting of the SIAM Texas-Louisiana Section, South Padre Island, TX, 2021/11.

14. Contributed talk: *Numerical studies on the high-order fractional Laplacian.* Midwest Numerical Analysis Day 2021, Rolla, MO, 2021/10.

Referee for Professional Journals

- Mathematics and Computers in Simulation

Teaching Experience

Missouri University of Science and Technology

- **Instructor** **Spring 2023**
  Elementary Differential Equations (MATH 3304) (98 students in total)
- **Co-Instructor** **Fall 2020**
  Mathematics Calculus for Engineers I (MATH 1214)
- **Grader** **Spring 2020**
  Mathematics Calculus for Engineers I (MATH 1214)
- **Grader** **Fall 2019**
  Mathematics Calculus for Engineers I (MATH 1214)

Professional Membership

- Society for Industrial and Applied Mathematics (SIAM), 2021-present

Skills

- Expert in Numerically Solving PDEs.
- Skilled in MATLAB, Python, Fortran, and LaTeX.
- Proficient in Data-driven Machine Learning