

Zhichao Peng

CONTACT INFORMATION

Department of Mathematics
Michigan State University
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PROFESSIONAL EXPERIENCE

Visiting Assistant Professor, Department of Mathematics, Michigan State University, Aug. 2020 – now

Mentors: Prof. Daniel Appelö and Prof. Yingda Cheng

Research intern, Los Alamos National Laboratory, May 2019 – Aug. 2019

Mentor: Dr. Xianzhu Tang

EDUCATION

Ph.D. in Applied Mathematics, Rensselaer Polytechnic Institute, Aug. 2020

Advisor: Prof. Fengyan Li

B.S. in Mathematics, Peking University, July 2015

RESEARCH INTERESTS

- Efficient numerical methods for wave equations and Maxwell's equations in the time and frequency domain, kinetic equations, plasma physics
- Data-driven and projection based reduced order modeling, especially for kinetic equations and transport problems
- Structure preserving numerical methods: asymptotic preserving, positivity preserving, energy stable
- Inverse problems, uncertainty quantification and optimal control in quantum computing
- Discontinuous Galerkin method, Discontinuous Petrov Galerkin method and embedded boundary finite difference method

PUBLICATIONS

- Refereed journal papers:
 1. [Z. Peng](#), [M. Wang](#), [F. Li](#), *A learning-based projection method for model order reduction of transport problems*, Journal of Computational and Applied Mathematics, Vol. 418, 114560, 2023
 2. [Z. Peng](#), [D. Appelö](#), *EM-WaveHoltz: A flexible frequency-domain method built from time-domain solvers*, IEEE Transactions on Antennas and Propagation, Vol. 70, Issue 7, 2022
 3. [Z. Peng](#), [Y. Chen](#), [Y. Cheng](#), [F. Li](#), *A reduced basis method for radiative transfer equation*, Journal of Scientific Computing, Vol. 91, 5, 2022
 4. [Z. Peng](#), [F. Li](#), *Asymptotic preserving IMEX-DG-S schemes for linear kinetic transport equations based on Schur complement*, SIAM Journal on Scientific Computing, Vol. 43, No. 2, pp. A1194-A1220, 2021
 5. [Z. Peng](#), [Y. Cheng](#), [J.-M. Qiu](#), [F. Li](#), *Stability-enhanced AP IMEX1-LDG method: energy-based stability and rigorous AP property*, SIAM Journal on Numerical Analysis, Vol. 59, No. 2, pp. 925-954, 2021
 6. [Z. Peng](#), [Q. Tang](#), [X.-Z. Tang](#), *An adaptive discontinuous Petrov-Galerkin method for the Grad-Shafranov equation*, SIAM Journal on Scientific Computing, Vol. 42, No. 5, pp. B1227-B1249, 2020

7. Z. Peng, Y. Cheng, J.-M. Qiu, F. Li, *Stability-enhanced AP IMEX-LDG schemes for linear kinetic transport equations under a diffusive scaling*, Journal of Computational Physics Vol. 415, 109485, 2020
8. Z. Peng, V. A. Bokil, Y. Cheng, F. Li, *Asymptotic and positivity preserving methods for Kerr-Debye model with Lorentz dispersion in one dimension*, Journal of Computational Physics, Vol. 402, 109101, 2020

- Submitted:

1. Z. Peng, D. Appelö, S. Liu, *Universal AMG accelerated embedded boundary method without small cell stiffness*, submitted to Journal of Scientific Computing, 2022
2. Z. Peng, Y. Chen, Y. Cheng, F. Li, *A micro-macro decomposed reduced basis method for the time dependent radiative transfer equation*, submitted to Multiscale Modeling & Simulation, 2022
3. L. Martinez, Z. Peng, D. Appelö, D. Tennant, A. Petersson, J. DuBois, Y. Rosen, *Noise-specific beats in the higher-level Ramsey curves of a transmon qubit*, submitted to Applied Physics Letters, 2022

- Preprints in preparation

1. Z. Peng, D. Appelö, A. Petersson, F. Garcia, Y. Cho *Where is the power switch? A mathematician's guide to using a quantum computer*

HONORS AND AWARDS

- 2020, The Joaquin B. Diaz Prize, Rensselaer Polytechnic Institute
- 2019, SIAM student travel award for SIAM Conference on Analysis of Partial Differential Equations (PD19)
- 2018, Founders Award of Excellence, Rensselaer Polytechnic Institute

TEACHING AND MENTORING

- Teaching
 - Fall 2021, Instructor, MTH 132 - Calculus I, Michigan State University
 - Spring 2021, Instructor, MTH 314 - Matrix Algebra with Computational Applications, Michigan State University
 - Fall 2020, Instructor, MTH 124 - Survey of Calculus I, Michigan State University
 - Fall 2019, Teaching Assistant, MATH 2400 - Introduction to Differential Equations, Rensselaer Polytechnic Institute
 - Fall 2018, Teaching Assistant, MATH 4090 - Foundation of Analysis, Rensselaer Polytechnic Institute
 - Fall 2017, Teaching Assistant, MATH 4200 - Mathematical Analysis I, Rensselaer Polytechnic Institute
 - Fall 2017, Teaching Assistant, MATH 4090 - Foundation of Analysis, Rensselaer Polytechnic Institute
- Undergraduate Research Mentoring
 - Co-mentoring, Fall 2021, Alexander Sietsema, Luke Perelli, Michigan State University
 - Project: Quantum Control: Algorithms, Reduced Order Models and Optimal Gate Design

- Co-mentoring, Spring 2021, Charlie Hultquist, Madeline Mitchell, Luke Perelli, Shun Yao Wang, Michigan State University
Discovering America program
Project: Quantum Control: Algorithms and Optimal Gate Design
- Co-mentoring, Summer 2016, Xiaoan Shen, Rensselaer Polytechnic Institute
Project: Mathematical Characterization of Bound Preserving Implicit Schemes

OUTREACH EXPERIENCE

MINISYMPOSIUM ORGANIZATION

- STEM Night, Donley Elementary School, East Lansing, MI, USA. Sep. 2022
- Co-organize “Recent Developments in Model Reduction and Low Rank Algorithms” at 2022 SIAM Texas-Louisiana Section, University of Houston, Houston, TX, USA, Nov. 2022
- Co-organize “High-order Numerical Methods for the Solution of Partial Differential Equations” at 2022 SIAM Great Lakes Section Meeting, Wayne State University, Detroit, MI, USA, Sep. 2022
- Organize “Recent Developments in Modeling and Computations of Kinetic Theory” at 2022 SIAM Annual Meeting, Pittsburgh, PA, USA, July 2022

PROFESSIONAL TRAVEL

- Spring 2020 Reunion Event, ICERM, Providence, RI, USA, May 2022 – June 2022
- Model and Dimension Reduction in Uncertain and Dynamic Systems, ICERM, Providence, RI, USA Jan. 2020 – May 2020
- Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, ICERM, Providence, RI, USA, July 2018
- Frontiers in Applied and Computational Mathematics, ICERM, Providence, RI, USA, Jan. 2017

PRESENTATIONS

- Invited talks
 - 2022 SIAM Texas-Louisiana Section, University of Houston, Houston, TX, USA, Nov. 2022
 - 2022 SIAM Great Lakes Section Meeting, Wayne State University, Detroit, MI, USA, Sep. 2022
 - 2022 SIAM Annual Meeting, Pittsburgh, PA, July 2022
 - ICERM Spring 2020 Reunion Event, ICERM, Providence, RI, USA, May 2022
 - Midwest Numerical Analysis Day, University of Michigan, Ann Arbor, MI, USA, May 2022
 - Michigan State University CMSE Brown Bag seminar, East Lansing, MI, USA, Feb. 2022 (virtual)
 - Joint Numerical Analysis Seminar, at KTH Royal Institute of Technology and Stockholm University, Stockholm, Sweden, Jan. 2022 (virtual)
 - Workshop on Modeling and Numerical Simulation of Non-Equilibrium Processes Part Two, National University of Singapore, Singapore, Jan. 2022 (virtual)
 - Department Seminar, Hunan University, Changsha, Hunan, China, Jan. 2022 (virtual)

- Numerical Analysis Seminar, University of Iowa, Iowa City, IA, USA, Oct. 2021 (virtual)
- Virtual 2021 SIAM Great Lakes Section Meeting, Oakland University, Rochester, MI, Apr. 2021 (virtual)
- Seminar, Institute of Computational Mathematics, Chinese Academy of Sciences, Beijing, China, Mar. 2021 (virtual)
- RTG Seminar, Rensselaer Polytechnic Institute, Troy, NY, USA, Oct. 2019
- Applied Math Days, Rensselaer Polytechnic Institute, Troy, NY, USA, Apr. 2019
- Seminar, School of Mathematical Sciences, Peking University, Beijing, China, Dec. 2018
- Seminar, School of Mathematical Sciences, University of Science and Technology of China, Hefei, China, Dec. 2018
- 2018 SIAM Annual Meeting, Oregon Convention Center, Portland, OR, USA, July 2018
- The 3rd Annual Meeting of SIAM Central States Section, Colorado State University, Fort Collins, CO, USA, Sep. 2017
- Poster
 - Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, ICERM, Providence, RI, USA, July 2018

REFEREE FOR
JOURNALS

SIAM Journal on Scientific Computing, SIAM Journal on Numerical Analysis, Journal of Computational Physics, Journal of Scientific Computing, Advances in Computational Mathematics, Journal of Applied Mathematics and Physics, IEEE Journal on Multiscale and Multiphysics Computational Techniques

RELEVANT
SKILLS

Programming language: Julia, C, C++, Fortran, Matlab, Python
 Softwares: MPI, OpenMP, TensorFlow, PETSC, HYPRE, MFEM, NGSolve, Qiskit, QUA, Git
 Language: English, Chinese