Zhichao Peng

CONTACT INFORMATION

Department of Mathematics
The Hong Kong University of Science and Technology

pengzhic@ust.hk
https://zhichaopengmath.github.io

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Mathematics, The Hong Kong University of Science and Technology, Aug. 2023 – now

Visiting Assistant Professor, Department of Mathematics, Michigan State University, Aug. 2020 – Jul. 2023

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 kinetic equations, acoustic and electromagnetic wave equations in the time and frequency domain
- 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

PUBLICATIONS

- Refereed journal papers:
  1. Z. Peng, Y. Chen, Y. Cheng, F. Li, *A micro-macro decomposed reduced basis method for the time dependent radiative transfer equation*, Multiscale Modeling and Simulation, Vol. 22, Issue 1, 2024
  2. Z. Peng, D. Appelö, S. Liu, *Universal AMG accelerated embedded boundary method without small cell stiffness*, Journal of Scientific Computing, vol. 97, 40, 2023
  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*, Applied Physics Letters,122, 114002, 2023
  4. 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
  5. H. Zhang, Z. Peng, *Total Generalized Variation for Triangulated Surface Data*, Journal of Scientific Computing, Vol. 93, 87, 2022
  6. 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
  7. Z. Peng, Y. Chen, Y. Cheng, F. Li, *A reduced basis method for radiative transfer equation*, Journal of Scientific Computing, Vol. 91, 5, 2022

8. 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
9. 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
10. 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
11. 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
12. 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, Reduced order model enhanced Source Iteration with Synthetic Acceleration for parametric radiative transfer equation, submitted to Journal of Computational Physics, 2024
- Technical report
  1. Z. Peng, D. Appelö, A. Petersson, F. Garcia, Y. Cho, *Mathematical approaches for characterization, control, calibration and validation of a quantum computing device*
- Preprint
  1. Z. Peng, D Appelö, A. Petersson, M. Motamed, F. Garcia, Y. Cho, *Deterministic and Bayesian Characterization of Quantum Computing Devices*

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
  - Spring 2024, Instructor, Numerical Methods for Data Analytics in Science, The Hong Kong University of Science and Technology
  - Fall 2023, Instructor, MATH 5311-Advanced Numerical Methods I, The Hong Kong University of Science and Technology
  - 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, Shunyao 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

- STEM Night, Donley Elementary School, East Lansing, MI, USA. Sep. 2022

Minisyposium organization

- 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
  - 2023 CSIAM Annual Conference, Kunming, China, Oct. 2023
  - 2023 ICIAM, Tokyo, Japan, Aug. 2023
  - 2023 Seminar Talk at University of Houston, Houston, China, Apr. 2023
  - 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, Heifei, 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