

Zhichao Peng

CONTACT INFORMATION	Department of Mathematics The Hong Kong University of Science and Technology	pengzhic@ust.hk https://zhichaopengmath.github.io
PROFESSIONAL EXPERIENCE	<p>Assistant Professor, Department of Mathematics, The Hong Kong University of Science and Technology, Aug. 2023 – now</p> <p>Visiting Assistant Professor, Department of Mathematics, Michigan State University, Aug. 2020 – Jul. 2023</p> <p>Mentors: Prof. Daniel Appelö and Prof. Yingda Cheng</p> <p>Research intern, Los Alamos National Laboratory, May 2019 – Aug. 2019</p> <p>Mentor: Dr. Xianzhu Tang</p>	
EDUCATION	<p>Ph.D. in Applied Mathematics, Rensselaer Polytechnic Institute, Aug. 2020</p> <p>Advisor: Prof. Fengyan Li</p> <p>B.S. in Mathematics, Peking University, July 2015</p>	
RESEARCH INTERESTS	<ul style="list-style-type: none">• 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	<ul style="list-style-type: none">• Refereed journal papers:<ol style="list-style-type: none">1. Z. Peng, <i>A Flexible GMRES Solver with Reduced Order Model Enhanced Synthetic Acceleration Preconditioner for Parametric Radiative Transfer Equation</i>, Journal of Computational Physics, Vol. 534, 114004, 20252. Z. Peng, <i>Reduced order model enhanced Source Iteration with Synthetic Acceleration for parametric radiative transfer equation</i>, Journal of Computational Physics, 2024, Vol. 517, 11330343. Z. Peng, Y. Chen, Y. Cheng, F. Li, <i>A micro-macro decomposed reduced basis method for the time dependent radiative transfer equation</i>, Multiscale Modeling and Simulation, Vol. 22, Issue 1, 20244. Z. Peng, D. Appelö, S. Liu, <i>Universal AMG accelerated embedded boundary method without small cell stiffness</i>, Journal of Scientific Computing, vol. 97, 40, 20235. L. Martinez, Z. Peng, D. Appelö, D. Tennant, A. Petersson, J. DuBois, Y. Rosen, <i>Noise-specific beats in the higher-level Ramsey curves of a transmon qubit</i>, Applied Physics Letters, 122, 114002, 20236. Z. Peng, M. Wang, F. Li, <i>A learning-based projection method for model order reduction of transport problems</i>, Journal of Computational and Applied Mathematics, Vol. 418, 114560, 2023	

7. H. Zhang, Z. Peng, *Total Generalized Variation for Triangulated Surface Data*, Journal of Scientific Computing, Vol. 93, 87, 2022
8. 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
9. Z. Peng, Y. Chen, Y. Cheng, F. Li, *A reduced basis method for radiative transfer equation*, Journal of Scientific Computing, Vol. 91, 5, 2022
10. 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
11. 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
12. 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
13. 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
14. 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. T. Jin, Z. Peng, Y. Xiang, Adaptive and hybrid reduced order models to mitigate Kolmogorov barrier in a multiscale kinetic transport equation, 2025
2. Y.-M. Law, Z. Peng, D. Appelö, T. Hagstrom, A P -Adaptive Hermite Method for Nonlinear Dispersive Maxwell's Equations, 2025
3. L. Ji, Z. Peng, Y. Chen, AAROC: Reduced Over-Collocation Method with Adaptive Time Partitioning and Adaptive Enrichment for Parametric Time-Dependent Equations, 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 2025, Instructor, Numerical Methods for Data Analytics in Science, The Hong Kong University of Science and Technology
 - Fall 2024, Instructor, MATH 5311-Advanced Numerical Methods I, The Hong Kong University of Science and Technology
 - 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, Shun Yao Wang, Michigan State University
 - Discovering America program
 - Project: Quantum Control: Algorithms and Optimal Gate Design
 - Co-mentoring, Summer 2016, Xiaolan 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 “Algorithms and Theories for the Dimensionality Reduction of Parametric Differential Equations” at The 13th China Mathematical Society Computational Mathematics Annual Conference, Changsha, Hunan, Aug. 2025
- Co-organize “Recent Developments of Numerical Methods and Modeling for Kinetic and Related Equations” at the Thrid HKSIAM Biennial Conference, CUHK, Hong Kong, Jul. 2025
- Co-organize “2024 Workshop on Mathematical Theories and Algorithms for AI for Science” at HKUST, Hong Kong, Sep. 2024

- 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
 - 21st NSNMF, Yining, China, Aug. 2025
 - The Third HKSIAM Biennial Conference, CUHK, Hong Kong, Jul. 2025
 - Seminar Talk, School of Mathematical Sciences, University of Science and Technology of China, Heifei, China, Jul. 2025
 - Seminar Talk, Shanghai University, 2025
 - Advanced Computational Mathematics Workshop, Shanghai Jiaotong University, Shanghai, China, May 2025
 - Efficient Numerical Methods Workshop, Beijing Normal University, Zhuhai Campus, Zhuhai, China, May 2025
 - HKUST-KAIST-NUS Joint Workshop on Partial Differential Equations and Scientific Computing, National University of Singapore, Singapore, Apr. 2025
 - Numerical Linear Algebra and Fast Algorithms Youth Forum, Xiangtang, Hunan, China, Jan. 2025
 - Computational Learning for Model Reduction, ICERM, Providence, RI, USA, Jan. 2025
 - First HKMS-HKSIAM Joint Young Scholars Symposium, HKU, Hong Kong, China, Dec. 2024
 - 2024 Workshop on Mathematical Theories and Algorithms for AI for Science, HKUST, Hong Kong, Sep. 2024
 - International Conference on Scientific Computation and Differential Equations, Singapore, July 2024
 - Seminar Talk at Zhejiang University, Hangzhou, Zhejiang, China, July 2024
 - 2024 East Asia Section of SIAM Annual Meeting, Macau, China, June-July 2024
 - 2023 CSIAM Annual Conference, Kunming, China, Oct. 2023
 - 2023 ICIAM, Tokyo, Japan, Aug. 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, 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, SIAM Journal on Applied Mathematics, Journal of Computational Physics, Mathematics of Computation, Journal of Scientific Computing, Communications in Computational Physics, Communications on Applied Mathematics and Computation, 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