

Kaihuang Chen

Ph.D. in Applied Mathematics
Large-Scale Optimization | GPU-Accelerated Scientific Computing
Hong Kong SAR, China

Profile

Completed doctoral research in large-scale optimization and high-performance scientific computing, with emphasis on algorithm design and GPU implementation for linear and quadratic programming. Research focuses on operator splitting methods, scalable sparse computation, and reproducible numerical experiments for large optimization models.

Research Interests

Numerical optimization; large-scale convex optimization; high-performance computing; GPU-accelerated optimization algorithms; linear programming; quadratic programming; operator splitting methods; and sparse scientific computing.

Education

The Hong Kong Polytechnic University (PolyU)

Sep 2020 – Feb 2026

Department of Applied Mathematics

Ph.D. in Applied Mathematics

Hunan University

Sep 2016 – Jun 2020

School of Mathematics

B.Sc. in Information and Computing Science

Publications

Journal Article

Chen, K., D. Sun, Y. Yuan, G. Zhang, and X. Zhao. 2026. *HPR-LP: An implementation of an HPR method for solving linear programming. Mathematical Programming Computation* 18:183–210.

Conference Publication

Lai, Y., B. Pan, K. Chen, Y. Yuan, and K. Zhou. 2024. *Collective Certified Robustness against Graph Injection Attacks. In Proceedings of the 41st International Conference on Machine Learning (ICML).*

Preprints

Chen, K., D. Sun, Y. Yuan, G. Zhang, and X. Zhao. 2025a. *HPR-QP: A dual Halpern–Peaceman–Rachford method for solving large-scale convex composite quadratic programming. arXiv preprint arXiv:2507.02470.*

Chen, K., D. Sun, Y. Yuan, G. Zhang, and X. Zhao. 2025b. *On the Relationships among GPU-Accelerated First-Order Methods for Solving Linear Programming. arXiv preprint arXiv:2509.23903.*

Chen, K., D. Sun, Y. Yuan, G. Zhang, and X. Zhao. 2025c. *Peaceman-Rachford Splitting Method Converges Ergodically for Solving Convex Optimization Problems. arXiv preprint arXiv:2501.07807.*

Software Projects

HPR-LP

github.com/PolyU-IOR/HPR-LP

- Julia/GPU solver for large-scale linear programming.

- Developed for reproducible large-scale benchmarking and high-performance optimization experiments.

HPR-QP

github.com/PolyU-IOR/HPR-QP

- Julia/CUDA solver for large-scale convex composite quadratic programming.
- Implements a dual Halpern–Peaceman–Rachford framework with practical enhancements for large sparse instances.
- Designed for GPU-accelerated research experiments and scalable numerical testing.

Technical Skills

Programming Julia, MATLAB, CUDA, C/C++

Research Areas Numerical optimization, convex optimization, LP, QP, operator splitting, scientific computing, sparse linear algebra, GPU computing