

# LING LIANG

Address: Weierstrass Institute, Mohrenstrasse 39, 10117 Berlin, Germany

Phone: (65) 94478207, (49) 15119449731

Email: [liang.ling@u.nus.edu](mailto:liang.ling@u.nus.edu)

Website: <https://liangling98.github.io/>

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## RESEARCH INTEREST

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- **Optimization**

Design, analyze and implement efficient algorithmic frameworks for solving large-scale optimization problems, including conic programming problems, nonsmooth optimization problems, nonlinear programming problems, and their applications.

- **Computational Optimal Transport and Applications**
- **Mathematical Foundations for Data Science**
- **Numerical Linear Algebra for Optimization**

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## EXPERIENCE

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- **Visiting Postdoctoral Researcher, Weierstrass Institute**  
March 2023 – present  
Advisor: Professor Jia-Jie Zhu
- **Research Fellow, National University of Singapore**  
January 2022 – February 2023  
Advisor: Professor Kim-Chuan Toh
- **Research Assistant, National University of Singapore**  
August 2021 – December 2021  
Advisor: Professor Kim-Chuan Toh

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## EDUCATION

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- **Ph.D. in Mathematics, National University of Singapore**  
August 2017 – November 2021  
Advisor: Professor Kim-Chuan Toh
- **B.Sc. in Mathematics, University of Science and Technology of China**  
September 2013 – July 2017  
Advisor: Professor Zhouwang Yang

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## AWARDS AND ACKNOWLEDGEMENTS

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- **Louis Chen Hsiao Yun Best Dissertation Prize, National University of Singapore, 2022**  
(Awarded annually to the student with the best PhD thesis in mathematics and its applications)
- **Top Graduate Tutor Award, National University of Singapore, 2019 and 2020**
- **Research Scholarship, National University of Singapore, 2017-2021**

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## TEACHING

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- **Graduate Tutor, National University of Singapore, August 2017 – May 2021**

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## PROGRAMMING SKILLS

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- **MATLAB & Julia**  
Strong experience in developing efficient and robust packages in optimization
- **C/C++ & Python**  
Intermediate experience

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## INVITED TALKS

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- **Argonne National Laboratory, Online Seminar, May 2022**  
An Inexact Projected Gradient Method with Rounding and Lifting by Nonlinear Programming for Solving Rank-One Semidefinite Relaxation of Polynomial Optimization
- **SIAM Conference on Optimization, Online Conference, July 2021**  
On Degenerate Doubly Nonnegative Projection Problems
- **Workshop on Matrix Optimization, Beijing, November 2019**  
A New Homotopy Proximal Variable-Metric Framework for Composite Convex Minimization
- **The Sixth International Conference on Continuous Optimization, Berlin, August 2019**  
A New Homotopy Proximal Variable-Metric Framework for Composite Convex Minimization

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## PUBLICATIONS

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(Note: \* = Corresponding Author)

- Hong T.M. Chu, **Ling Liang**, Kim-Chuan Toh, and Lei Yang.  
“An Efficient Implementable Inexact Entropic Proximal Point Algorithm for A Class of Linear Programming Problems.”  
Computational Optimization and Applications (2023): 1-40.
- Heng Yang, **Ling Liang\***, Luca Carlone, and Kim-Chuan Toh.  
“An Inexact Projected Gradient Method with Rounding and Lifting by Nonlinear Programming for Solving Rank-One Semidefinite Relaxation of Polynomial Optimization.”  
Mathematical Programming (2022): 1-64.
- **Ling Liang\***, Xudong Li, Defeng Sun, and Kim-Chuan Toh.  
“QPPAL: A Two-Phase Proximal Augmented Lagrangian Method for High Dimensional Convex Quadratic Programming.”  
ACM Transactions on Mathematical Software (TOMS) 48, no. 3 (2022): 1-27.
- Ying Cui, **Ling Liang\***, Defeng Sun, and Kim-Chuan Toh.  
“On Degenerate Doubly Nonnegative Projection Problems.”  
Mathematics of Operations Research 47, no. 3 (2022): 2219-2239.
- Tran-Dinh Quoc, **Ling Liang**, and Kim-Chuan Toh.  
“A New Homotopy Proximal Variable-Metric Framework for Composite Convex Minimization.”  
Mathematics of Operations Research 47, no. 1 (2022): 508-539.
- **Ling Liang\***, Defeng Sun, and Kim-Chuan Toh.  
“An Inexact Augmented Lagrangian Method for Second-Order Cone Programming with Applications.”  
SIAM Journal on Optimization 31, no. 3 (2021): 1748-1773.

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## PREPRINTS

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- **Ling Liang**, Defeng Sun, and Kim-Chuan Toh.  
“A Squared Smoothing Newton Method for Semidefinite Programming.”  
arXiv preprint arXiv: 2303.05825 (2023).
- Ching-Pei Lee, **Ling Liang**, Tianyun Tang, and Kim-Chuan Toh.  
“Escaping Spurious Local Minima of Low-Rank Matrix Factorization through Convex Lifting.”  
arXiv preprint arXiv:2204.14067 (2022).

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## PROFESSIONAL SERVICES

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- **Referee for Journals**

Mathematical Programming, SIAM Journal on Optimization, SIAM Journal on Mathematics of Data Science, Computational Optimization and Applications, Journal of Scientific Computing, Optimization Methods and Software

- **Conference and Workshop Organizations**
  - Session Chair, Optimization in the Big Data Era, National University of Singapore, 2022.
- **Judge for Singapore International Mathematics and Computational Challenge, November 2022.**
- **AD-HOC Non-Teaching Consultation Work, National University of Singapore, November 2022.**

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## REFERENCES

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- **Professor Kim-Chuan Toh**  
[mattohkc@nus.edu.sg](mailto:mattohkc@nus.edu.sg)  
Department of Mathematics and Institute of Operations Research and Analytics  
National University of Singapore, 10 Lower Kent Ridge Road, 119076, Singapore
- **Professor Defeng Sun**  
[defeng.sun@polyu.edu.hk](mailto:defeng.sun@polyu.edu.hk)  
Department of Applied Mathematics  
The Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong
- **Professor Ying Cui**  
[yingcui@umn.edu](mailto:yingcui@umn.edu)  
Department of Industrial and Systems Engineering  
University of Minnesota, Minneapolis, Minnesota, U.S.A
- **Professor Victor Tan (Concerns Teaching)**  
[mattanv@nus.edu.sg](mailto:mattanv@nus.edu.sg)  
Department of Mathematics  
National University of Singapore, 10 Lower Kent Ridge Road, 119076, Singapore