

ZHANG Haixiang

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Education

September 2015 July 2019	School of Mathematical Sciences, Peking University Bachelor's Degree in Computational Mathematics
September 2016 July 2019	School of Electronics Engineering and Computer Science, Peking University Bachelor's Degree in Computer Science and Technology
July 2018 September 2018	Department of Mathematics, University of California, Los Angeles Visiting Student in Prof. Wotao Yin's Group
August 2019 Present	Department of Mathematics, University of California, Berkeley Ph.D. Student in Applied Mathematics

Research Experiences

March 2017 July 2019	On the analysis of minimizing a quartic function over sphere Advisor: Prof. Zaiwen Wen (Beijing International Center for Mathematical Research) <ul style="list-style-type: none">▶ Analyzed the geometric properties in the diagonal quadratic term case and the rank-one case using the Wirtinger Calculus.▶ Proved the strict-saddle property and polynomial convergence time for in some specific parameters ranges and proved to be the best ranges.▶ Estimated the Kurdyka-Łojasiewicz Exponent and the local convergence rate.
July 2018 September 2018	Geometric analysis of minimizing a quartic function over a single sphere Advisor: Professor Zaiwen Wen (BICMR) and Professor Wotao Yin (UCLA) <ul style="list-style-type: none">▶ Applied SDP Relaxation method and analyzed the properties of the KKT system. Constructed a certification for global optimality and found the conditions for uniqueness and rank recovery.▶ Analyzed the performance of Riemannian Trust Region method and Adaptive Regularized Newton method on non-rotating BEC problem, and the dual ADMM method on the relaxed problem.
March 2017 February 2018	Minimal energy pathway between defects in nematic liquid crystals Advisor: Professor Pingwen Zhang (Department of Mathematics, Peking University) <ul style="list-style-type: none">▶ Found new defects patterns of nematic liquid crystals using three-dimensional Landau-de Gennes model and computed the Minimal Energy Pathway between defects patterns using optimization-based string method.▶ Determined the saddle points and the energy barrier of the pathways, and analyzed the bifurcation phenomenon according to the devices size and the stability of different defects.
February 2018 October 2018	High index saddle points in nematic liquid crystals confined in a square Advisor: Professor Pingwen Zhang (Department of Mathematics, Peking University) <ul style="list-style-type: none">▶ Computed indices of defects patterns in nematic liquid crystals confined on a square and analyzed the possible transition pathways using HiOSD method.▶ Constructed new three-dimensional defects and MEPs passing through WORS solution, three dimensional solutions and other high order defects.

Internships

January 2019	Natural Language Processing intern @ AI-Lab, Bytedance Technology
May 2019	Mentor: Hang Li (Director of AI-Lab, Bytedance Technology) ‣ Application of Region embedding method to sequence labelling tasks, e.g. Named Entity Recognition (NER) and Chinese Word Segmentation (CWS).

Publications

- “*On the geometric analysis of a quartic-quadratic optimization problem under a spherical constraint*”,
H. Zhang, A. Milzarek, Z. Wen, W. Yin, *submitted to Mathematical Programming*, 2019.

Invited Talks

April 2019	Seminar of The Elite Program of Comp. and Applied Math for Ph.D. Students, Peking University
September 2018	Short talk at The Mathematical Programming Branch of Operation Society of China, Beihang University (BUAA)

Competences & Languages

Programming	Python == C == C++ == MATLAB > R == JAVA
Skills	Tensorflow, Keras, \LaTeX , SQL, Flask
Languages	Chinese – Native English – TOEFL 106; GRE 157 + 170 + 3.5
Hobby	Soccer – First level soccer referee of the PKU Football Association

Selected Courses

Math & Physics	Mathematical Analysis II (Honor) – 97.5 Advanced Algebra II (Honor) – 93 Abstract Algebra – 95 Geometry – 95.5 General Physics II – 100
Probability	Probability Theory – 97.5 Introduction to Stochastic Process – 92
Computing Science	Numerical Algebra – 94.5 Numerical Analysis – 93 Optimization – 94
Data Science	Alg. in Big Data Analysis – 97 Statistical Learning – 94 Deep Learning – 90
Computer Science	Data Structure & Alg. (B) – 96 Microcomputer (B) – 98 Principle of Prog. Lang. – 93

Awards & Honors

2017-2019	Member of the Elite Undergraduate Program for Applied Mathematics
2019	Excellent Graduate of Peking University
2016, 2017, 2018	Learning Excellence Student
2016, 2017, 2018	May-Fourth scholarship
2017, 2018	Honorable Mention of Mathematical Contest In Modeling
2017	National Innovation Experiment Funding for Undergraduate
2016, 2017	First Prize of Jiangzehan Modeling Contest
2016	First Prize of National Undergraduate Physics Competition
2014	Gold Medal in Chinese Mathematical Olympiad and National Team Selection Camp