Yuan Zhou

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Academic Appointments

Jul. 2024–	Associate Professor (tenured), Department of Mathematics, University of Kentucky
Aug. 2017 –Jun. 2024	Assistant Professor (tenure-track), Department of Mathematics, University of Kentucky

Education

2012–2017	University of California, Davis, USA Ph.D. in Applied Mathematics Advisor: Matthias Köppe
2008–2012	École Centrale Paris, France Master's degree in Engineering Major: Applied Mathematics, Minor: Finance and Strategy
2011–2012	Université Paris-Dauphine, France Master of Science, Applied Mathematics: Actuarial Science Member of L'institut des Actuaires français
2006–2008	Lycée Hoche, Classe préparatoire MPSI-MP*, Versailles, France Specialized in Mathematics, Physics and Informatics
2003–2006	High School Affiliated to Fudan University, Shanghai, China

Academic Honors

May 2016	Honorable Mention in the 2016 Mixed Integer Programming Workshop poster competition
Oct. 2005	First prize in the Chinese National Mathematical Olympiad
2003, 2004, 2005	First prize in the Chinese National Olympiad in Informatics
Aug. 2004	Bronze medal in China Girls Mathematical Olympiad

Funded Projects

2020–2025	"Collaborative Research: Next-Generation Cutting Planes: Compression, Automation, Diversity, and Computer-Assisted Mathematics", PI: Yuan Zhou, National Science Foundation, Division Of Mathematical Sciences, Award Number: 2012429; start date: 08/01/2020, end date: 31/07/2025; awarded amount: $179,768.
2022–2023	SEC Faculty Travel Program; awarded amount: $2,000.
2022	University of Kentucky Libraries' Alternative Textbook Grant Program; awarded amount: $1,500.
2019–2021	"2019 Mixed Integer Programming Workshop", PI: Yuan Zhou, Office of Naval Research, Long Range Broad Agency Announcement (BAA) for Navy and Marine Corps Science and Technology; start date: 08/01/2019, end date: 07/31/2021; awarded amount: $6,000.
2019–2020	University of Kentucky College of Arts & Sciences OVPR Research and Creative Activities Support Program; awarded amount: $500.

Scientific Publications

Published Papers and Papers Accepted for Publication

[1] Sattar Vakili, Qing Zhao, and Yuan Zhou, *Time-varying stochastic multi-armed bandit problems*, Proceedings of the 48th IEEE Asilomar Conference on Signals, Systems, and Computers, November 2014, pp. 2103–2107, `https://doi.org/10.1109/ACSSC.2014.7094845`.

[2] Matthias Köppe and Yuan Zhou, *An electronic compendium of extreme functions for the Gomory–Johnson infinite group problem*, Operations Research Letters **43** (2015), no. 4, 438–444, `https://doi.org/10.1016/j.orl.2015.06.004`.

[3] Matthias Köppe and Yuan Zhou, *Toward computer-assisted discovery and automated proofs of cutting plane theorems*, Combinatorial Optimization: 4th International Symposium,

ISCO 2016, Vietri sul Mare, Italy, May 16–18, 2016, Revised Selected Papers (Raffaele Cerulli, Satoru Fujishige, and A. Ridha Mahjoub, eds.), Springer International Publishing, Cham, 2016, pp. 332–344, https://doi.org/10.1007/978-3-319-45587-7_29, Acceptance rate 38.8% (38 / 98), ISBN 978-3-319-45587-7.

[4] Chun Yu Hong, Matthias Köppe, and Yuan Zhou, *Software for cut-generating functions in the Gomory–Johnson model and beyond*, Mathematical Software – ICMS 2016: 5th International Conference, Berlin, Germany, July 11–14, 2016, Proceedings (Gert-Martin Greuel, Thorsten Koch, Peter Paule, and Andrew Sommese, eds.), Springer International Publishing, 2016, pp. 284–291, https://doi.org/10.1007/978-3-319-42432-3_35, ISBN 978-3-319-42432-3.

[5] Matthias Köppe and Yuan Zhou, *New computer-based search strategies for extreme functions of the Gomory–Johnson infinite group problem*, Mathematical Programming Computation **9** (2017), no. 3, 419–469, https://doi.org/10.1007/s12532-016-0115-9.

[6] Matthias Köppe and Yuan Zhou, *On the notions of facets, weak facets, and extreme functions of the Gomory–Johnson infinite group problem*, Integer Programming and Combinatorial Optimization: 19th International Conference, IPCO 2017, Waterloo, ON, Canada, June 26–28, 2017, Proceedings (Friedrich Eisenbrand and Jochen Koenemann, eds.), Springer International Publishing, Cham, 2017, pp. 330–342, https://doi.org/10.1007/978-3-319-59250-3_27, Acceptance rate 28.8% (36 / 125), ISBN 978-3-319-59250-3.

[7] Chun Yu Hong, Matthias Köppe, and Yuan Zhou, *Equivariant perturbation in Gomory and Johnson's infinite group problem (V). Software for the continuous and discontinuous 1-row case*, Optimization Methods and Software **33** (2018), no. 3, 475–498, https://doi.org/10.1080/10556788.2017.1366486.

[8] Matthias Köppe and Yuan Zhou, *Equivariant perturbation in Gomory and Johnson's infinite group problem. VI. The curious case of two-sided discontinuous minimal valid functions*, Discrete Optimization **30** (2018), 51–72, https://doi.org/10.1016/j.disopt.2018.05.003.

[9] Robert Hildebrand, Matthias Köppe, and Yuan Zhou, *On perturbation spaces of minimal valid functions: Inverse semigroup theory and equivariant decomposition theorem*, Integer Programming and Combinatorial Optimization. IPCO 2019 (A. Lodi and V. Nagarajan, eds.), Lecture Notes in Computer Science, vol. 11480, Springer, Cham, 2019, p. 247–260, https://doi.org/10.1007/978-3-030-17953-3_19, Acceptance rate 28.9% (33 / 114), ISBN 978-3-030-17952-6.

[10] Matthias Köppe and Yuan Zhou, *Facets, weak facets, and extreme functions of the Gomory–Johnson infinite group problem*, Mathematical Programming **187** (2021), 195–252, https://doi.org/10.1007/s10107-020-01477-2.

[11] Robert Hildebrand, Matthias Köppe, and Yuan Zhou, *Equivariant perturbation in Gomory and Johnson's infinite group problem. VII. Inverse semigroup theory, closures, decomposition of perturbations*, Open Journal of Mathematical Optimization **3** (2022), 1–44 (en), https://doi.org/10.5802/ojmo.16.

Submitted Papers

[12] Matthias Köppe and Yuan Zhou, *All cyclic group facets inject*, 2019, `arXiv:1807.09758`, submitted to Mathematics of Operations Research.

[13] Allison Fitisone and Yuan Zhou, *Solid angle measure of polyhedral cones*, 2023, `arXiv:2304.11102`, submitted to Discrete & Computational Geometry.

Mathematical Software

[14] Peijun Xiao, Zeyi Wang, Yuan Zhou, and Matthias Köppe, *sage-numerical-interactive-mip: Interactive mixed integer linear programming solver*, 2020, Version 0.2, `https://doi.org/10.5281/ZENODO.3627400`.

[15] Matthias Köppe, Yuan Zhou, Chun Yu Hong, and Jiawei Wang, *cutgeneratingfunctionology: Python code for computation and experimentation with cut-generating functions*, `https://github.com/mkoeppe/cutgeneratingfunctionology`, 2022, Version 1.5.2, `https://doi.org/10.5281/zenodo.5812491`.

[16] Yuan Zhou, *Contributions to SageMath in the form of change tickets: #34479, #33847, #33677, #33596, #33088, #31802, #32181, #31748, #31725, #31702, #31701, #31315, #25122, #25095, #21608, #20331, #20126, #18838, #18763, #18764, #18732, #18685, #18286, #17714, #16907, #15729; and several tickets submitted for review*, 2015–2022.

Teaching Experience

2023/2024	*MA416G Introduction to Optimization*
	MA714 Topics class: Discrete Optimization
	MA427G Financial Mathematics
2022/2023	*MA416G Introduction to Optimization*
	MA213 Calculus III
2021/2022	*MA427G Financial Mathematics*
	MA514 Combinatorial Structures And Techniques
	MA113 Calculus I
2020/2021	*MA514 Combinatorial Structures And Techniques*
	MA213 Calculus III
2019/2020	*A&S320 Financial Mathematics*
	MA416G Introduction to Optimization
	MA415G Combinatorics and Graph Theory
2018/2019	*MA714 Topics in Discrete Math: Discrete and Mixed-Integer Optimization*
	MA416G Introduction to Optimization

	MA417G Decision Making Under Uncertainty
2017/2018	*MA416G Introduction to Optimization*
	MA417G Decision Making Under Uncertainty
	MA320 Introductory Probability
2016/2017	*Combinatorics* (instructor, Associate in Mathematics)
	Calculus: Differential Calculus (lead teaching assistant)
	Linear Algebra (lead teaching assistant)
	Mathematics and Computers (teaching assistant)
	Mathematics for Data Analytics & Decision Making (teaching assistant)
2015/2016	*Calculus: Partial Derivatives and Series* (teaching assistant)
2014/2015	*Mathematical Optimization* (teaching assistant)
2013/2014	*Linear Algebra* (teaching assistant)
2012/2013	*Number Theory* (teaching assistant)
	Linear Algebra (teaching assistant)

Advising and Mentoring

2024–2025	Pablo Castilla *MA 611 & 767 Independent Work Mathematics* Preparation for the Master's exam
2021–2024	Allison Fitisone *MA 611 & 767 Independent Work Mathematics* Ph.D. thesis "Solid Angle Measure Approximation Methods for Polyhedral Cones", April 2024.
Spring 2023	Kristina Sosa *HON 491 Honors Thesis* Project "An Initiative to Rehabilitate Domestic Violence Offenders & Prevent More Violence", website and LMS developments.
Summer 2022	Yueqi Li *EXP 396 Experimental Education* Google Summer of Code 2022 with SageMath, funded by Google Project "Implement piecewise functions of one or several variables", project size: 175 hours during 12 weeks.
Spring 2022	Bethany Baker *MA 611 Independent Work Mathematics* Preparation for the discrete math preliminary exam.
2020–2021	Philip Meersman

	MA 398 & 399 Independent Work Mathematics Honors thesis "Using Semialgebraic Parametric Analysis by Metaprogramming in Portfolio Optimization" in Spring 2021. Meersman was admitted to the Economics PhD program at Vanderbilt University in 2021.
Summer 2018	Benton Girdler J.C Eaves Summer Research Award Project "Polyhedral complexes and piecewise linear functions" Girdler received an NSF Graduate Research Fellowship and was admitted to the Neuroscience PhD program at the University of Chicago in 2021.
Winter/Spring 2017	Peijun Xiao, Shuidie Yao Undergraduate research (co-advised with Matthias Köppe)
Summer 2015–2016	Zeyi Wang, Peijun Xiao Undergraduate research (co-advised with Matthias Köppe)
Winter/Spring 2015	Masumi Sugiyama Undergraduate research (co-advised with Matthias Köppe)

Professional Activities

Refereeing Activities

I have acted as a referee for the following journals:

Mathematical Programming Series A and B

Mathematics of Operations Research

SIAM Journal on Optimization

Journal of Global Optimization,

and the following conferences:

Mixed Integer Programming Workshop

Integer Programming and Combinatorial Optimization Conference

Reviewer for AMS Mathematical Reviews

Conference and Workshop Organization

2023–2024	Local organizer of MIP 2024
Jul. 2023	Co-organizer of the Hybrid Sage Days 120

2022–2023	Member of the committee of the *Mixed Integer Programming Society*, the governing board of MIPS
Spring 2023	Co-organizer of the ICERM workshop on *Linear and Non-Linear Mixed Integer Optimization*
June, 2022	Co-organizer of the Sage Days 112.358. Chair of the session *SageMath Developer Community and Google Summer of Code*
2020–2021	Co-chair of the program committee for *MIP 2021*
Oct, 2020	Co-organizer of the *Sage Days 110*
May, 2020	Co-organizer of the *Sage Days 109*
2019–2020	Co-chair of the program committee for *MIP 2020*
2018–2019	Member of the program committee for *MIP 2019*
Oct. 26, 2016	Organizer of the *Sage Day 81.5*

Other Professional Service

2023–2024	Tenure-track search committee member, University of Kentucky
2023–2024	Departmental inclusive excellence committee member, University of Kentucky
Spring 2023	Alumni Day co-organizer, University of Kentucky
2022–2023	Graduate program committee member, University of Kentucky
2021–2023	Undergraduate Math Club faculty advisor, University of Kentucky
Since Jul. 2020	National Alliance for Doctoral Studies in the Mathematical Sciences mentor
2020–2023	Discrete math preliminary examination committee member, University of Kentucky
2019–2020	Postdoc search committee member, University of Kentucky
Nov. 2019	Julia Robinson Mathematics Festival volunteer, Lexington, KY
Since 2019	Member of 3 Master's committees and 2 Ph.D. committees, University of Kentucky
Spring 2014	Calculus room coordinator at UC Davis Mathematics

Scientific Activities

Invited Conference Talks

Aug. 29, 2024 *Solid angles of polyhedral cones and the strength of cutting planes*, ICERM workshop on Discrete Optimization, Providence, RI, USA

Jul. 24, 2024 *Semialgebraic characterization of triangulation*, International Symposium on Mathematical Programming, Montreal, Canada

Oct. 15, 2023 *Solid angle measure for the importance of facets of cyclic group polyhedra*, INFORMS Annual Meeting, Phoenix, AZ, USA

Jul. 6, 2023 *Solid angle measure of polyhedral cones in arbitrary dimensions*, Jon–Shmuel Halfway to Twelfty Conference, École des Ponts, Paris, France

Jun. 2, 2023 *Solid angles of polyhedral cones and the strength of cutting planes*, SIAM Conference on Optimization, Seattle, WA, USA

Apr. 24, 2023 *Measuring the importance of facets of cyclic group polyhedra using solid angles*, ICERM workshop on Trends in Computational Discrete Optimization, Providence, RI, USA

Jun. 2, 2022 *Solid angles of polyhedral cones via decompositions and power series*, Symbolic System Symposium, Global Virtual Sage Days 112.358, Online

Oct. 23, 2019 *Shorter automatic extremality proofs for cut-generating functions*, INFORMS Annual Meeting, Seattle, WA, USA

Jan. 6, 2019 *cutgeneratingfunctionology: Python software for multi-row general purpose cuts for MILPs*, INFORMS Computing Society Conference, Knoxville, TN, USA

Apr. 8–9, 2017 *Parameter space analysis for algebraic Python programs in SageMath*, Women in Sage Math at AWM Research Symposium, Los Angeles, CA, USA

Jan. 15, 2017 *Toward computer-assisted discovery and automated proofs of cutting plane theorems*, INFORMS Computing Society Conference, Austin, TX, USA

Contributed Conference Talks

May 23, 2019 *On perturbation spaces of minimal valid functions: Inverse semigroup theory and equivariant decomposition theorem*, IPCO Conference, Ann Arbor, MI, USA

July 3, 2018 *All finite group complexity injects*, International Symposium on Mathematical Programming, Bordeaux, France

Aug. 4, 2017 *Practical semialgebraic geometry for computer-assisted proofs*, SIAM Conference on Applied Algebraic Geometry, Atlanta, GA, USA

Nov. 15, 2016 *Computer-assisted discovery and automated proofs of cutting plane theorems*, INFORMS Annual Meeting, Nashville, TN, USA

July 11, 2016 *Parameter space analysis for algebraic Python programs in SageMath*, International Congress on Mathematical Software, Berlin, Germany

July 13, 2015 *Extreme functions for the Gomory–Johnson infinite group problem*, International Symposium on Mathematical Programming, Pittsburgh, PA, USA

Seminar Talks

Apr. 26, 2024 *Solid Angles of Polyhedral Cones and the Strength of Cutting Planes*, Department of Industrial and Systems Engineering Seminar, The University of Tennessee, Knoxville, TN, USA

Oct. 23, 2023 *Semialgebraic parametric analysis by metaprogramming and applications in optimization*, Operations Research Seminar, Clemson University, SC, USA

Feb. 14, 2023 *Semialgebraic parametric analysis by metaprogramming and applications in optimization*, ICERM Semester Program Seminar, RI, USA

Jan. 26, 2023 *Semialgebraic parametric analysis by metaprogramming (SPAM) and its applications in optimization*, Center for Applied Optimization, University of Florida, FL, USA

Nov. 3, 2021 *Semialgebraic parametric analysis and automatic theorem proving in SageMath*, Leslie Comrie Seminar Series, School of Computing and Mathematical Sciences, University of Greenwich, UK (Online)

Mar. 5, 2020 *Semialgebraic parametric analysis and automatic theorem proving for cut-generating functions*, ISE invited seminar series, Virginia Tech, VA, USA

Oct. 17, 2019 *Parameter space analysis and automatic theorem proving in SageMath*, Applied Math Seminar, University of Kentucky, KY, USA

Nov. 12, 2018 *Integer optimization, cutting planes, and approximation theory*, Discrete CATS Seminar, University of Kentucky, KY, USA

June 8, 2018 *Cut-generating functions in the Gomory–Johnson model*, Discrete Optimization Seminar, EPFL, Switzerland

July 8, 2016 *Extreme functions for the Gomory–Johnson infinite group problem*, Seminar of the Institute of Mathematical Optimization, University of Magdeburg, Germany

July 5, 2016 — *Toward computer-assisted discovery and automated proofs of cutting plane theorems*, Applied Geometry and Discrete Mathematics Research Seminar, TU Munich, Germany

Dec. 18, 2014, May 15, July 6, 2015 — *Extreme functions for the Gomory–Johnson infinite group problem*, Optimization Seminar, University of California, Davis, CA, USA

Academic visits

Nov.–Dec. 2024 — CERMICS, École nationale des ponts et chaussées, France

Jan.–May 2023 — ICERM Semester Program *Discrete Optimization: Mathematics, Algorithms, and Computation*, Brown University, USA

Jan. 16–29, 2023 — Center for Applied Optimization, University of Florida, USA

Aug. 24– 28, 2020 — ICERM Virtual workshop: Symmetry, Randomness, and Computations in Real Algebraic Geometry.

Mar. 4–8, 2020 — Department of Industrial and Systems Engineering, Virginia Tech, USA

Oct. 15–19, 2018 — IMA COIN-OR Workshop, University of Minnesota, USA

June 1–30, 2018 — Discrete Optimization Group, EPFL, Switzerland

Apr. 3–8, 2018 — SageMath Coding Sprint on Optimization and Polyhedral Geometry, IMA, University of Minnesota, USA

Feb. 19–26, 2017 — Zuse Institute Berlin, Germany

Poster Presentations

June 19, 2017, June 26, 2017 — *Two-sided discontinuous cut-generating functions in the Gomory–Johnson model*, MIP workshop 2017, Montréal, Canada; and IPCO 2017, Waterloo, Canada

May 23, 2016 — *Toward computer-assisted discovery and automated proofs of cutting plane theorems*, MIP workshop 2016, Coral Gables, FL, USA

Feb. 27, 2016 — *Software and computer-based search for extreme functions of the Gomory–Johnson infinite group problem*, Annual Math. Association of America Golden Meeting, Davis, CA, USA

June 1, 2015 — *Software and computer-based search for extreme functions of the Gomory–Johnson infinite group problem*, MIP workshop 2015, Chicago, IL, USA

Courses Taken

Summer Schools

June 20–July 1, 2016	Mixed Integer Nonlinear Programming: Theory, algorithms and applications, IMUS–MSRI Summer Graduate School, Seville, Spain
July 4–12, 2015	Summer School on Polyhedral Combinatorics, Carnegie Mellon University, Pittsburgh, PA, USA

Graduate Level Coursework

UC Davis	Analysis (3 quarters), Applied Mathematics (3 quarters), Probability Theory (3 quarters), Optimization (3 quarters), Numerical Methods, Matrix Computations, Analysis of Algorithms, Estimation and Detection of Signals in Noise
École Centrale Paris	Financial Mathematics (various courses), Numerical Methods for Finance, Advanced Statistics (various courses), Advanced Database Systems, Life Insurance, Non-life Insurance, Reinsurance, etc.
Univ. Paris-Dauphine	Actuarial Risk Theory, Asset Liability Management, Model Calibration in Finance and Actuarial Science, Economics of Risk and Insurance, Accounting, Introduction to Insurance (various courses), Introduction to Solvency II Directive, etc.

Work Experience

Apr. 2012–Aug. 2012	Actuarial Intern at AXA France, in Life Insurance – Individual Protection Products team. Project: *Impact of medical underwriting in individual protection insurance*. Supervisor: Céline Finas
Oct. 2011–Mar. 2012	Risk Management Analyst Intern at BNP Paribas, in Group Risk Management – Investments and Markets team. Project: *Economical scenario modeling*. Supervisor: Thomas Haudecoeur
Mar. 2011–Aug. 2011	IT Consulting Intern at ANEO, in software development team. Project: *Speed up trading*. Supervisor: Nicolas Dufaur
Sep. 2010–Mar. 2011	Risk Management Analyst Intern at Amadeus France, in Payment Product Definition team. Project: *Credit card risk management study – Fraud screening*. Supervisor: Cyril Bele
June 2009–July 2009	Summer Blue Collar Intern at PSA Peugeot Citroën, on the engine assembly line. Supervisor: Yoann Delzongle

Personal

Citizenship	China
Languages	Chinese (native), English (fluent), French (fluent), Japanese (basic)