CURRICULUM VITAE

Personal Data

Name: Jie Wang
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Work Experience

- 7/2021–present, Associate research fellow, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- 7/2019–6/2021, Postdoctoral researcher, Centre National de la Recherche Scientifique, Mentor: Victor Magron and Jean-Bernard Lasserre
- 7/2017–6/2019, Postdoc, Peking University, Mentor: Bican Xia

Education

- Doctor of Mathematics (9/2012-7/2017)
  - Academy of Mathematics and Systems Science, Chinese Academy of Sciences
  - Supervisor: Xiao-Shan Gao
- Bachelor of Mathematics (9/2008-7/2012)
  - University of Science and Technology of China

Research Interests

polynomial optimization, semidefinite programming, real algebraic geometry, quantum information

Publications

Conference Papers:

1. Victor Magron and **Jie Wang**, TSSOS: A Julia Library to Exploit Sparsity for Large-Scale Polynomial Optimization, Effective Methods in Algebraic Geometry Conference (MEGA), 2021.
2. **Jie Wang**, Martina Maggio and Victor Magron, SparseJSR: A Fast Algorithm to Compute Joint Spectral Radius via Sparse SOS Decompositions, 2021 American Control Conference (ACC), 2254-2259, 2021.
3. **Jie Wang** and Victor Magron, A Second Order Cone Characterization for Sums of Nonnegative Circuits, in *Proceedings of* the *45th International Symposium on Symbolic and Algebraic Computation*, ACM, 450-457, 2020.
4. **Jie Wang**, Haokun Li and Bican Xia, A New Sparse SOS Decomposition Algorithm Based on Term Sparsity, in *Proceedings of the 44th International Symposium on Symbolic and Algebraic Computation*, ACM, 347-354, 2019.

Journal Papers:

5. Igor Klep, Victor Magron, and Jurij Volčič and **Jie Wang**, State Polynomials: Positivity, Optimization and Nonlinear Bell Inequalities, *Mathematical Programming*, 2023.
6. **Jie Wang**, Corbinian Schlosser, Milan Korda and Victor Magron, Exploiting Term Sparsity in Moment-SOS hierarchy for Dynamical Systems, *IEEE Transactions on Automatic Control*, 2023.
7. Victor Magron and **Jie Wang**, SONC Optimization and Exact Nonnegativity Certificates via Second-Order Cone Programming, *Journal of Symbolic Computation*, 115:346-370, 2023.
8. **Jie Wang**, Victor Magron and Jean-Bernard Lasserre, Certifying Global Optimality of AC-OPF Solutions via Sparse Polynomial Optimization, *Electric Power Systems Research,* 2022.
9. Nils Vreman, Paolo Pazzaglia, **Jie Wang**, Victor Magron and Martina Maggio, Stability of Control Systems under Extended Weakly-Hard Constraints, IEEE Control Systems Letters, 6: 2900-2905, 2022.
10. **Jie Wang**, Victor Magron, Jean-Bernard Lasserre and Ngoc Hoang Anh Mai, CS-TSSOS: Correlative and Term Sparsity for Large-Scale Polynomial Optimization, ACM Transactions on Mathematical Software, 48(4):1-26, 2022.
11. Ngoc Hoang Anh Mai, Jean-Bernard Lasserre, Victor Magron and **Jie Wang**, Exploiting Constant Trace Property in Large-Scale Polynomial Optimization, ACM Transactions on Mathematical Software, 48(4):1-39, 2022.
12. **Jie Wang**, Nonnegative Polynomials and Circuit Polynomials, *SIAM Journal on Applied Algebra and Geometry*, 6(2):111-133, 2022.
13. **Jie Wang** and Victor Magron, Exploiting Sparsity in Complex Polynomial Optimization, *Journal of Optimization Theory and Applications*, 192(1):335-359, 2021.
14. **Jie Wang** and Victor Magron, Exploiting Term Sparsity in Noncommutative Polynomial Optimization, *Computational Optimization and Applications*, 80(2):483-521, 2021.
15. Jeffrey Uhlmann and **Jie Wang**, On Radically Expanding the Landscape of Potential Applications for Automated Proof Methods, *SN Computer Science*, 2(4):1-9, 2021.
16. **Jie Wang**, Victor Magron and Jean-Bernard Lasserre, Chordal-TSSOS: a Moment-SOS Hierarchy that Exploits Term Sparsity with Chordal Extension, *SIAM Journal on Optimization*, 31(1):114-141, 2021.
17. **Jie Wang**, Victor Magron and Jean-Bernard Lasserre, TSSOS: A Moment-SOS Hierarchy that Exploits Term Sparsity, *SIAM Journal on Optimization*, 31(1):30-58, 2021.
18. Xiaoxian Tang and **Jie Wang**, Bistability of Sequestration Networks, *Discrete & Continuous Dynamical Systems - B*, 26(3):1337-1357, 2021.
19. **Jie Wang**, Systems of Polynomials with at Least One Positive Real Zero, *Journal of Algebra and Its Applications*, 19(10), 2020.
20. **Jie Wang**, Toric P-Difference Varieties, *Science China Mathematics*, 63(4):643-670, 2020.
21. **Jie Wang**, Finite Basis for Radical Well-Mixed Difference Ideals Generated by Binomials, *Communications in Algebra*, 46(6):2589-2599, 2018.
22. **Jie Wang**, Difference Indices of Quasi-Prime Difference Algebraic Systems, *Journal of Symbolic Computation*, 87:1-13, 2018.
23. **Jie Wang**, Difference Indices of Quasi-Regular Difference Algebraic Systems, *Journal of Mathematical Sciences: Advances and Applications*, 46:31-49, 2017.
24. **Jie Wang**, Monomial Difference Ideals, *Proceedings of the American Mathematical Society*, 145(4):1481-1496, 2017.
25. XiaoShan Gao, Zhang Huang, **Jie Wang** and ChunMing Yuan, Toric Difference Variety, *Journal*

of Systems Science & Complexity, 30(1):173-195, 2017.

Monograph:

Victor Magron and **Jie Wang**, Sparse Polynomial Optimization: Theory and Practice, World Scientific Press, 2023.

Invited Talks (excluding conference presentations)

1. "Nonnegative Polynomials and Circuit Polynomials", SIAM Conference on Applied Algebraic Geometry, Switzerland, 7/2019
2. "Exploiting Term Sparsity in SOS programming and Sparse Polynomial Optimization", International Conference on Continuous Optimization, Berlin, 8/2019
3. "Exploiting Sparsity in Noncommutative Polynomial Optimization", European Congress of Mathematics, online, 6/2021
4. "Exploiting Sparsity in Large-Scale Polynomial Optimization", SIAM Conference on Optimization, online, 7/2021
5. "A Second Order Cone Representation of SONC cones", SIAM Conference on Applied Algebraic Geometry, online, 8/2021
6. "Polynomial Optimization and Low-Rank SDPs", Seattle, SIAM Conference on Optimization, 6/2023

Honor & Awards

2016, Gained the "Dean Special Prize" of Academy of Mathematics and Systems Science, CAS

2017, Gained the title of "Outstanding Graduates" of University of Chinese Academy of Sciences

2019, SIAM Conference on Applied Algebraic Geometry travel grant for early career researcher

2021, Selected in "Chen-Jingrun Future Star" Program of Academy of Mathematics and Systems Science, CAS

2022, Gained the "Guan-Zhaozhi" Youth Research Award, Institute of Systems Science

2022, Gained the Best Youth Paper Award of Beijing Operations Research Society

Project Funding

1. General Program of China Postdoctoral Science Foundation: Theory of Sparse Nonnegative Polynomials and Effective Decision algorithms, Period: 2018.6-2019.6, Leader.

2. General Program of National Natural Science Foundation of China: Use Symbolic-Numeric Hybrid Computation in Algebraic Vision, Period: 2022.1-2025.12, Participating.

3. Youth Talent Development Special Project of China Operations Research Society: Development and Applications of Large-Scale Polynomial Optimization Sover, Period: 2023.1-2024.12, Leader.

4. Youth Program of National Natural Science Foundation of China: Polynomial Optimization Theory, Algorithms, and Applications, Period: 2023.1-2025.12, Leader.

5. National Key Research and Development Program of China: Mathematical Methods and Applications for Verification of Safety-Critical Software Frameworks, Period: 2023.1-2027.12, Participating.

Teaching Experience

Autumn 2017, Basic Geometry, Peking University

Autumn 2023, Algebraic and Geometric Approaches in Applied Mathematics, CAS

Open-source Software

1. TSSOS

TSSOS is a Julia package for sparse polynomial optimization.

https://github.com/wangjie212/TSSOS

2. SONCSOCP

SONCSOCP is a Julia package for unconstrained sparse polynomial optimization based on the second-order cone representation of SONC cones.

https://github.com/wangjie212/SONCSOCP

3. SparseJSR

SparseJSR is a Julia package for computing joint spectral radii of matrices based on sparse SOS decompositions.

https://github.com/wangjie212/SparseJSR

4. ChordalGraph

ChordalGraph is an extension of the Julia package Graphs to handle chordal graphs.

https://github.com/wangjie212/ChordalGraph

5. NCTSSOS

NCTSSOS is a Julia package for sparse noncommutative polynomial optimization.

https://github.com/wangjie212/NCTSSOS

6. ManiSDP

ManiSDP aims to solve the low-rank linear semidefinite program (SDP) via manifold optimization.

https://github.com/wangjie212/ManiSDP-matlab

Professional Services

Reviewer for Journals

SIAM Journal on Applied Algebra and Geometry, SIAM Journal on Optimization, Mathematical Programming, Mathematics of Operations Research, Journal of Symbolic Computation, Journal of System Science and Complexity

Reviewer for Conferences

International Symposium on Symbolic and Algebraic Computation (2018, 2019, 2020, 2022, 2023), Conference on Effective Methods in Algebraic Geometry (2021)

Reviewer for Databases

zbMATH, MathSciNet

Member of the Computer Mathematics Professional Committee of Chinese Mathematical Society

Member of the Special Committee on “Artificial Intelligence and Mathematical Software” of the 14th Computer Mathematics Conference of Chinese Mathematical Society