

# Curriculum Vitae

## Personal Data

Full name	Yi Zhang
Date of birth	12.12.1988
Place of birth	Changzhou, Jiangsu Province, China
Nationality	Chinese
Marital Status	Single



## Contact

E-mail	<a href="mailto:Yi.Zhang03@xjtlu.edu.cn">Yi.Zhang03@xjtlu.edu.cn</a>
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## Research Interests

- Computer Algebra
- Algorithmic Combinatorics
- Algebraic Theory of Differential and Difference Equations
- Algebraic Statistics
- Coding and Cryptography

## Education

- 09/2013 – 02/2017    Ph.D. in Mathematics with distinction, [Institute for Algebra](#), [Johannes Kepler University Linz](#), Austria. (Co-supervisors: Prof. [Manuel Kauers](#) and Prof. [Ziming Li](#))
- 09/2011 – 07/2016    Ph.D. in Applied Mathematics, [Key Laboratory of Mathematics Mechanization](#), [Academy of Mathematics and Systems Science](#), [University of Academy of Sciences](#), Beijing, China. (Co-supervisors: Prof. Manuel Kauers and Prof. Ziming Li)
- 09/2007 – 07/2011    B.Sc. in Mathematics, [School of Mathematical Sciences](#), [Soochow University](#), Suzhou, China.

## Work Experience

- 02/2020 – present    Assistant Professor, [Department of Foundational Mathematics](#), [Xi'an Jiaotong-Liverpool University](#), Suzhou, China.
- 09/2018 – 01/2020    Research Associate, [Department of Mathematical Sciences](#), [The University of Texas at Dallas](#), Dallas, USA. (Advisor: Prof. [Carlos E. Arreche](#))
- 03/2017 – 08/2018    Postdoctoral researcher, [Johann Radon Institute for Computational and Applied Mathematics](#) (RICAM), [Austrian Academy of Sciences](#), Linz, Austria. (Advisor: Prof. [Christoph Koutschan](#))

## Visiting Experience

- 06/2019 – 07/2019    Visiting scholar, [Faculty of Mathematics and Statistics](#), [Ton Duc Thang University](#), Ho Chi Minh City, Vietnam. (Host researcher: Dr. [Thieu N. Vo](#))
- 05/2017    Visiting scholar, [Department of Mathematics](#), [Kobe University](#), Kobe, Japan. (Host researcher: Prof. [Nobuki Takayama](#))

## Teaching Experience

Spring 2022	Lecturer. (Multivariate Calculus) Xi'an Jiaotong - Liverpool University, Suzhou, China.
Fall 2021	Lecturer. (Analysis 1) Xi'an Jiaotong - Liverpool University, Suzhou, China.
Spring 2021	Lecturer. (Multivariate Calculus) Xi'an Jiaotong - Liverpool University, Suzhou, China.
Fall 2020	Lecturer. (Analysis 1) Xi'an Jiaotong - Liverpool University, Suzhou, China.
Spring 2020	Lecturer. (Multivariate Calculus) Xi'an Jiaotong - Liverpool University, Suzhou, China.
Fall 2019	Instructor. ( <a href="#">Integral Calculus</a> ) The University of Texas at Dallas, Dallas, USA.
Spring 2019	Instructor. ( <a href="#">Linear Algebra</a> ) The University of Texas at Dallas, Dallas, USA.
Fall 2010	Teaching internship. (High School Mathematics) Suzhou High School Affiliated to Xi'an Jiaotong University, Suzhou, China.

## Professional Service Activities

2021 – present	PGRS (Postgraduate Research Scholarship) Panel Member. Xi'an Jiaotong - Liverpool University, Suzhou, China.
2020 – 2021	Global Engagement Officer. Xi'an Jiaotong - Liverpool University, Suzhou, China.

## Professional Memberships

2021 – present	Fellow of The Higher Education Academy. In recognition of attainment against the UK Professional Standards Framework for teaching and learning support in higher education. Fellowship reference: PR227162. Date of Fellowship: August 24th, 2021.
2018 – present	Reviewer for Mathematical Reviews/MathSciNet.

## Awards

07/2021	2021 Jiangsu Province Innovation & Entrepreneurship Doctor-Talent Program (RMB 150,000), Jiangsu, China.
07/2016	<a href="#">ISSAC'16 Distinguished Student Author Award</a> , SIGSAM, Association for Computing Machinery (ACM).
09/2009 – 07/2010	The Second Prize Scholarship of Soochow University, Suzhou, China.
09/2008 – 07/2009	The First Prize Scholarship of Soochow University, Suzhou, China.

09/2007 – 07/2008	The First Prize Scholarship of Soochow University, Suzhou, China.
09/2007 – 07/2008	The Zhu Jingwen Scholarship of Soochow University, Suzhou, China.
09/2007 – 07/2008	The Merit Student of Soochow University, Suzhou, China.

## Grants

10/2021 – 09/2023	Natural Science Foundation of the Jiangsu Higher Education Institutions of China Programme-General Programme, <b>Principle Investigator</b> . No. 21KJB110032. “Algebraic and Numerical Analysis of Differential Equations based on Computer Algebra”, RMB 30, 000.
01/2022 – 12/2024	National Science Foundation of China Young Scientist Fund, <b>Principle Investigator</b> . No. 12101506. “Theory and Algorithms of Algebraic Differential and Difference Equations based on Symbolic Computation”, RMB 300, 000.
03/2021 – 02/2024	XJTLU Research Development Fund, <b>Principle Investigator</b> . No. RDF-20-01-12. RMB 60, 000.

## PhD Thesis

- Yi Zhang. *Univariate Contraction and Multivariate Desingularization of Ore Ideals*. PhD thesis, Institute for Algebra, Johannes Kepler University Linz, 2017. arXiv:[1710.07445](https://arxiv.org/abs/1710.07445)

## Publications

### Published

1. Zhimin Sun, Xiangyong Zeng, Lin Yi and Yi Zhang (corresponding author). *The Expansion Complexity of Ultimately Periodic Sequences over Finite Fields*, IEEE Transactions on Information Theory, 67 (11), pp. 7550-7560, 2021. DOI:[10.1109/TIT.2021.3112824](https://doi.org/10.1109/TIT.2021.3112824). (SCI, JCR Q1)
2. Sebastian Falkensteiner, Yi Zhang and Thieu N. Vo. *On Existence and Uniqueness of Formal Power Series Solutions of Algebraic Ordinary Differential Equations*, 2020, accepted by Mediterranean Journal of Mathematics. arXiv:[1803.09646](https://arxiv.org/abs/1803.09646). (SCI)
3. Carlos E. Arreche and Yi Zhang (corresponding author). *Computing Differential Galois Groups of Second-order Linear  $q$ -Difference Equations*, Advances in Applied Mathematics, 132, 102273, 2022. DOI:[10.1016/j.aam.2021.102273](https://doi.org/10.1016/j.aam.2021.102273), arXiv:[2009.14026](https://arxiv.org/abs/2009.14026). (SCI)

4. Nobuki Takayama, Lin Jiu, Satoshi Kuriki and Yi Zhang (corresponding author). *Computation of the Expected Euler Characteristic for the Largest Eigenvalue of a Real Wishart Matrix*, *Journal of Multivariate Analysis*, 179, 104642, 2020. DOI:[10.1016/j.jmva.2020.104642](https://doi.org/10.1016/j.jmva.2020.104642), arXiv:[1903.10099](https://arxiv.org/abs/1903.10099). (SCI)
5. Thieu N. Vo and Yi Zhang (corresponding author). *Rational Solutions of First-Order Algebraic Ordinary Difference Equations*, *Advances in Applied Mathematics*, 117, 102018, 2020. DOI:[10.1016/j.aam.2020.102018](https://doi.org/10.1016/j.aam.2020.102018), arXiv:[1901.11048](https://arxiv.org/abs/1901.11048). (SCI)
6. Thieu N. Vo and Yi Zhang (corresponding author). *Rational Solutions of High-Order Algebraic Ordinary Differential Equations*, *Journal of Systems Science and Complexity*, 33, pp. 821-835, 2020. DOI:[10.1007/s11424-019-8133-0](https://doi.org/10.1007/s11424-019-8133-0), arXiv:[1709.04174](https://arxiv.org/abs/1709.04174). (SCI)
7. Shaoshi Chen, Manuel Kauers, Ziming Li and Yi Zhang (corresponding author). *Apparent Singularities of D-finite Systems*, *Journal of Symbolic Computation*, 95, pp. 217-237, 2019. DOI:[10.1016/j.jsc.2019.02.009](https://doi.org/10.1016/j.jsc.2019.02.009), arXiv:[1705.00838](https://arxiv.org/abs/1705.00838). (SCI)
8. Ting Guo, Christian Krattenthaler and Yi Zhang (corresponding author). *On (shape-)Wilf-equivalence for words*, *Advances in Applied Mathematics*, 100, pp. 87-100, 2018. DOI:[10.1016/j.aam.2018.05.006](https://doi.org/10.1016/j.aam.2018.05.006), arXiv:[1802.09856](https://arxiv.org/abs/1802.09856). (SCI)
9. Christoph Koutschan and Yi Zhang (corresponding author). *Desingularization in the  $q$ -Weyl Algebra*. *Advances in Applied Mathematics*, 97, pp. 80–101, 2018. DOI:[10.1016/j.aam.2018.02.005](https://doi.org/10.1016/j.aam.2018.02.005), arXiv:[1801.04160](https://arxiv.org/abs/1801.04160). (SCI)
10. Yi Zhang (corresponding author). *Contraction of Ore Ideals with Applications*. In *Proceedings of the 2016 International Symposium on Symbolic and Algebraic Computation (ISSAC)*, pp. 413-420, ACM Press, 2016. DOI:[10.1145/2930889.2930890](https://doi.org/10.1145/2930889.2930890), arXiv:[1511.07922](https://arxiv.org/abs/1511.07922). [Distinguished Student Author Award] (EI, ISSAC is a top international conference in the field “Algorithms and Theory”, NUS evaluation: Rank 1, AUS evaluation: A+)

## Submitted/in preparation

1. Yi Zhang. *Desingularization of Linear Mahler Operators*, 2021, in preparation.
2. Carlos E. Arreche and Yi Zhang. *Mahler Residues for Rational Functions*, 2021, in preparation.
3. Alin Bostan, Jordan Tirrell, Bruce W. Westbury and Yi Zhang. *On Some Combinatorial Sequences Associated to Invariant Theory*, 2021, arXiv:[2110.13753](https://arxiv.org/abs/2110.13753), submitted.

## Research Notes

- Yi Zhang. *Testing  $q$ -shift Equivalence of Polynomials*, July, 2017.
- Yi Zhang. *Integer Vectors of a Fundamental Parallelepiped*, 2016.
- Ziming Li and Yi Zhang. *A Note on Gröbner Bases of Ore Polynomials over a PID*, 2016. <https://yzhang1616.github.io/GB.pdf>

## Software

- [Mihailovs\\_Conjecture.nb](#), a Mathematica notebook for proving Mihailovs' conjecture by the method of creative telescoping. It is based on joint work with Jordan Tirrell and Bruce W. Westbury. The notebook requires the availability of Koutschan's package [HolonomicFunctions.m](#).
- [ansatz.m](#), a Mathematica package for computing the expansion complexity of a given finite length sequences. It is based on joint work with Zhimin Sun and Xiangyong Zeng.
- [TestNonvanishing.nb](#), a Mathematica notebook for checking the nonvanishing property of algebraic ordinary differential equations in Kamke's collection. It is based on joint work with Sebastian Falkensteiner and N. Thieu Vo. The notebook requires the availability of the Mathematica package [Kamke\\_ODE.m](#).
- [zof.m](#), a Mathematica package for generating 0-1-fillings of a Ferrers board (shape), checking the number of sigma-avoiding 0-1-fillings of a Ferrers board, generating generalized 0-1-fillings of a Ferrers board, and checking the number of generalized 0-1-fillings of a Ferrers board with weight  $n$  such that the longest ne-chain has length  $u$  and the longest se-chain has length  $v$ . It is based on joint work with Ting Guo and Christian Krattenthaler. For a demonstration of the package, see the [zof.nb](#) notebook.
- [Example1\\_HGM.nb](#), a Mathematica notebook for the demonstration of the holonomic gradient method for the evaluation of expectation of an Euler characteristic number. It is based on joint work with Satoshi Kuriki and Nobuki Takayama. The notebook requires the availability of Koutschan's package [HolonomicFunctions.m](#).
- [KamkeODEs.mw](#), a Maple worksheet for checking the (completely) maximal comparability and noncriticality of algebraic ordinary differential equations in Kamke's collection. It is based on joint work with Dr. Thieu Vo Ngoc. The worksheet requires the availability of the Maple package [KamkeODEs.mpl](#).
- [qDesingularization.m](#), a Mathematica package for computing desingularized operators and the  $q$ -Weyl closure of a given  $q$ -difference operator in the first  $q$ -Weyl algebra. It is based on joint work with Dr. Christoph Koutschan. The package requires the availability of Koutschan's package [HolonomicFunctions.m](#) and Kauer's package [Singular.m](#). For a description of the usage of the package, see the [Example.nb](#) notebook.

## Talks

1. *Apparent Singularities of  $D$ -finite Systems*. Invited talk at Key Laboratory of Mathematics Mechanization, Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences, Beijing, China, October, 2021.
2. *Desingularization in the  $q$ -Weyl algebra*. Invited talk at the Workshop on Combinatorics,  $q$ -series, and Symbolic Computation in Suzhou Area, School of Mathematical Sciences, Soochow University, Suzhou, China, October, 2021.

3. *On Sequences Associated to the Invariant Theory of Rank Two Lie Algebras*. Invited talk at School of Mathematical Sciences, Soochow University, Suzhou, China, September, 2021.
4. *On Sequences Associated to the Invariant Theory of Rank Two Lie Algebras*. Contributed talk at the 26th International Conference on Applications of Computer Algebra (ACA'21), Virtual, Online, July, 2021.
5. *On Sequences Associated to the Invariant Theory of Rank Two Lie Algebras*. Contributed talk at the 12th Annual Conference on Computer Mathematics (CM'21), Guilin, China, June, 2021.
6. *On Sequences Associated to the Invariant Theory of Rank Two Lie Algebras*. Invited talk at Beihang University, Beijing, China, October, 2020.
7. *On Sequences Associated to the Invariant Theory of Rank Two Lie Algebras*. Invited talk at Mahidol University International College, Bangkok, Thailand, January, 2020.
8. *Apparent Singularities of D-finite Systems*. Invited talk at Kolchin Seminar, CUNY Graduate Center, New York, USA, December, 2019.
9. *Computations of the Expected Euler Characteristic for the Largest Eigenvalue of a Real Wishart Matrix*. Contributed talk at SIAM TX/LA Section (The 2nd Annual Meeting of the SIAM Texas Louisiana Section), Southern Methodist University, Dallas, USA, November, 2019.
10. *Computations of the Expected Euler Characteristic for the Largest Eigenvalue of a Real Wishart Matrix*. Invited talk at Key Laboratory of Mathematics Mechanization, Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences, Beijing, China, July, 2019.
11. *Computations of the Expected Euler Characteristic for the Largest Eigenvalue of a Real Wishart Matrix*. Invited talk at Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences, Austria, May, 2019.
12. *Desingularization in the  $q$ -Weyl algebra*. Invited talk at Key Laboratory of Mathematics Mechanization, Academy of Mathematics and Systems Sciences, Chinese Academy of Sciences, Beijing, China, July, 2018.
13. *Desingularization in the  $q$ -Weyl algebra*. Contributed talk at ACA'18 (the 24th Conference on Applications of Computer Algebra), the Faculty of Mathematics, The University of Santiago de Compostela, Santiago, Spain, June, 2018.
14. *Laurent Series Solutions of Algebraic Ordinary Differential Equations*. Invited talk at Computer Algebra Seminar, Research Institute for Symbolic Computation (RISC), Johannes Kepler University Linz, Austria, November, 2017.
15. *Apparent Singularities of D-finite Systems*. Contributed talk at ACA'17 (the 23rd Conference on Applications of Computer Algebra), Jerusalem College of Technology, Jerusalem, Israel, July, 2017.

16. *Contraction of Linear Difference and Differential Operators*. Contributed talk at ISSAC'16 (the 41st International Symposium on Symbolic and Algebraic Computation), Wilfrid Laurier University, Waterloo, Canada, July, 2016.
17. *Contraction of Linear Difference and Differential Operators*. Invited talk at the seminar of Center for Combinatorics, Nankai University, Tianjin, China, June, 2016.
18. *An Algorithm for Contraction of an Ore Ideal*. Invited talk at the seminar of Institute of Discrete Mathematics and Geometry, Vienna University of Technology, Vienna, Austria, October, 2015.
19. *The Restriction Problem for D-finite Functions*. Contributed talk at the Workshop on Computational and Algebraic Methods in Statistics, The University of Tokyo, Tokyo, Japan, March, 2015.
20. *An Algorithm for Decomposing Multivariate Hypergeometric Terms*. Contributed talk at CM'13 (the 5th National Conference of Computer Mathematics), Jilin University, Changchun, China, August, 2013.

## Peer-Reviewing Activities

For each journal and conference the number of completed reviews in given in parentheses.

- Mathematical Reviews (1)
- Maple Conference (1)
- Mediterranean Journal of Mathematics (1)
- Conferences on Applications of Computer Algebra (1)
- Journal of Systems Science and Complexity (3)
- Journal of Computational and Applied Mathematics (1)
- Advances in Applied Mathematics (1)
- International Symposia on Symbolic and Algebraic Computation (4)
- Journal of Symbolic Computation (3)

## Further Skills

- Programming Skills: C, Matlab, Maple, Mathematica, Macaulay2, Sage and Python
- Spoken Language: Chinese (native), English (fluent), German (basic)