

Dr. CHENQI MOU

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Beihang University, China

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Born on 14/11/1984
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EMPLOYMENT

01/07/2020 – Now Associate Professor, *Beihang University, China*
01/01/2018 – 31/12/2020 Adjunct Researcher, *Beijing Advanced Innovation Center for Big Data and Brain Computing, China*
20/09/2013 – 31/07/2020 Assistant Professor, *Beihang University, China*

EDUCATION

01/09/2007 – 24/06/2013 Combined Graduate–Doctoral Program at *Beihang University, China*
Ph.D. in Applied Mathematics
Supervisor: Dongming Wang, Professor
Thesis: Solving Polynomial Systems over Finite Fields: Algorithms, Implementation and Applications
21/09/2009 – 30/06/2013 Doctoral Program at *Université Pierre et Marie Curie, France*
Ph.D. in Computer Science (Double Degrees)
Supervisor: Jean-Charles Faugère, Research Director
01/09/2003 – 07/07/2007 Undergraduate Program at *Beihang University, China*
Bachelor of Science in Mathematics and Applied Mathematics

RESEARCH INTERESTS

Symbolic Computation, Polynomial System Solving, Combinatorial Algebraic Geometry (Applied Mathematics / Theoretical Computer Science)

HONORS

The Applications of Computer Algebra Early Researcher Award 2023
28th International Conference on Applications of Computer Algebra
Wen-Tsün Wu Award for Young Scholar in Computer Mathematics 2021
Chinese Society of Computer Mathematics, for contributions to symbolic solving of polynomial systems
Award for Excellent Teaching in Graduate Courses 2020
Beihang University, China, for the course *Computer Algebra*

Award for Teaching Achievements, First Prize 2014
Beihang University, China, for the textbook Polynomial Algebra (in Chinese)

ACADEMIC ACTIVITIES

Committee Member of

- Chinese Society of Computer Mathematics 2016–

Editorial Board Member of

- Journal of Systems Science and Complexity 2020–
- Mathematics in Computer Science 2021–
- Journal of Systems Science and Mathematical Sciences (in Chinese) 2019–

Member of Program Committee of

- 26th International Workshop on Computer Algebra in Scientific Computing (**Co-chair**)
Rennes, France, 2–6/09/2024
- Computer Mathematics 2024 *Fuzhou, China, 13–16/06/2024*
- 25th International Workshop on Computer Algebra in Scientific Computing (**Co-chair**)
Havana, Cuba, 28/08–1/09/2023
- Computer Mathematics 2023 *Dalian, China, 15–18/06/2023*
- 24th International Workshop on Computer Algebra in Scientific Computing
Gebze, Turkey, 22–26/08/2022
- 47th International Symposium on Symbolic and Algebraic Computation *Lille, France, 4–7/07/2022*
- 23th International Workshop on Computer Algebra in Scientific Computing
Sochi, Russia, 13–17/09/2021
- Computer Mathematics 2021 (**Vice Chair**) *Guilin, China, 4–7/06/2021*
- 22th International Workshop on Computer Algebra in Scientific Computing
Linz, Austria, 14–18/09/2020
- 8th International Conference on Mathematical Aspects of Computer and Information Sciences
(**Track co-chair**) *Istanbul, Turkey, 13–15/11/2019*
- Computer Mathematics 2019 *Chengdu, China, 24–27/10/2019*
- Computer Mathematics 2018 *Wuhan, China, 26–28/10/2018*
- 13th International Conference on Artificial Intelligence and Symbolic Computation
Suzhou, China, 16–19/09/2018
- 6th International Congress on Mathematical Software *South Bend, Indiana, USA, 24–27/07/2018*
- Computer Mathematics 2017 *Xiangtan, China, 18–21/10/2017*
- Computer Mathematics 2016 *Shenzhen, China, 11–13/11/2016*
- 5th International Congress on Mathematical Software *Berlin, Germany, 11–14/07/2016*
- 6th International Conference on Mathematical Aspects of Computer and Information Sciences
Berlin, Germany, 11–13/11/2015

Chair of Organization Committee of

- 4th Summer School in Symbolic Computation *Beijing, China, 3–9/08/2015*

Publicity Co-chair of

- 5th International Conference on Mathematical Aspects of Computer and Information Sciences
Nanning, China, 11–13/12/2013

Co-organizer of

- Intensive Training in High-Performance Computing *Beijing, China, 16–20/12/2019*
- International Seminar on Differential, Difference, and Algebraic Systems with Applications
Nanning, China, 29–31/01/2018
- Workshop in Logic, Algebra and Computation *Beijing, China, 9/12/2013*

Member of Local Arrangements of

- 44th International Symposium on Symbolic and Algebraic Computation (**Co-chair**)
Beijing, China, 15–18/07/2019
- 4th International Conference on Mathematical Aspects of Computer and Information Sciences
Beijing, China, 19–21/10/2011
- 1st International Conference on Symbolic Computation and Cryptography
Beijing, China, 28–30/04/2008

GRANTS AWARDED

Gröbner Bases of Determinantal Ideals: Theories and Applications <i>Principal Investigator, Fund for General Program, NSFC</i>	01/01/2025–31/12/2028 430,000 CNY
Polynomial System Solving Based on Graph Theory <i>Principal Investigator, Fund for General Program, NSFC</i>	01/01/2020–31/12/2023 520,000 CNY
Symbolic Methods for Polynomial System Solving <i>Principal Investigator, Program for Talented Youth Support, Beihang University</i>	01/03/2019–31/12/2022 500,000 CNY
Optimization Theory and Efficient Algorithms for Coordinativity of Complex Networks <i>Participant, Fund for Key Program, Beijing Municipal Natural Science Foundation</i>	01/10/2018–30/09/2022 100,000 CNY received
Elimination Theory and Methods Based on Connections Between Characteristic Sets and Groebner Bases <i>Participant, Fund for General Program, NSFC</i>	01/01/2018–31/12/2021 96,000 CNY received
Tracking and Measurement in Collective Intelligence Based Software Development <i>Participant, Fund for Major Program, NSFC</i>	01/01/2017–31/12/2021 284,980 CNY received
Triangular Decomposition Methods for Structured Polynomial Systems <i>Principal Investigator, Fund for Young Scientists, NSFC</i>	01/01/2015–31/12/2017 220,000 CNY
Efficient Symbolic Computation Algorithms for Solving Sparse Polynomial Systems <i>Principal Investigator, Basic Scientific Funding for Central Universities in China</i>	01/03–31/12/2014 200,000 CNY

SELECTED CONFERENCE TALKS

Invited Talks

- On the Chordality of Ordinary Differential Triangular Decomposition in Top-down Style
XII. Conference on Differential Algebra and Related Topics (invited talk) Kassel, Germany, 9-12/04/2024
- Chordal Graphs in Triangular Decomposition in Top-Down Style

Geometry of Polynomial System Solving, Optimization and Topology (invited talk)
Paris, France, 16-20/10/2023

Characteristic Decomposition: Connecting Lexicographic Groebner Bases and Triangular Sets
SIAM Conference on Applied Algebraic Geometry 2023 (invited session talk)
Eindhoven, The Netherlands, 10-14/07/2023

Implementation and Application of Chordality Preserving Top-down Algorithms for Triangular Decomposition
Dagstuhl Seminar 22072: New Perspectives in Symbolic Computation and Satisfiability Checking (invited talk, online)
Schloss Dagstuhl, Germany, 13-18/02/2022
Workshop on Software for Error-Free Computing (invited talk, online)
Chongqing, China, 25/11/2021

Graph Structures in Polynomial Systems Solving: from the Viewpoint of Variable Orderings
International Symposium for Centennial Birthday of Wen-Tsun Wu's (invited session talk)
Beijing, China, 12-17/05/2019
Computer Mathematics 2018 (plenary youth talk)
Wuhan, China, 26-28/10/2018
Joint International Meeting of CMS and AMS (invited session talk)
Shanghai, China, 11-14/06/2018

On the Chordality of Polynomial Sets in Triangular Decomposition in Top-Down Style
3rd Workshop on Combinatorics and Symbolic Computation (invited talk)
Dalian, China, 12-14/10/2018
Polynomial Computer Algebra 2018 (plenary talk)
St. Petersburg, Russia, 16-21/04/2018

On the Connection Between Lexicographic Gröbner Bases and Triangular Sets
Annual Meeting of CSIAM 2018 (invited session talk)
Chengdu, China, 13-16/09/2018
SIAM Conference on Applied Algebraic Geometry 2017 (invited minisymposia talk)
Atlanta, Georgia, USA, 31/07-04/08/2017

Bifurcation Analysis of Dynamic Systems using Symbolic Methods
Workshop on Symbolic-Numeric Methods for Differential Equations and Applications (invited talk)
New York, USA, 20/07/2018

Triangular Sets over F_2 VS Satisfiability Checking: A Potential Connection and Interaction?
Dagstuhl Seminar 15471: Symbolic Computation and Satisfiability Checking (invited talk)
Schloss Dagstuhl, Germany, 15-20/11/2015

Simple Triangular Decomposition over Finite Fields
ICIAM 2015 (invited minisymposia talk)
Beijing, China, 10-14/08/2015

Sparse FGLM Algorithms for Solving Polynomial Systems
NCMIS Youth Forum (invited talk)
Beijing, China, 16/10/2018
CDZ Sino-German Workshop on Computation and Reasoning with Constraints (invited talk)
Beijing, China, 23-29/11/2014

Fast Algorithm for Change of Ordering of Zero-dimensional Gröbner Bases with Sparse Multiplication Matrices
International Workshop on Certified and Reliable Computation (invited talk)
Nanning, China, 17-20/07/2011

Contributed Talks

DetGB: A software package for computing Gröbner bases of determinantal ideals
International Congress on Mathematical Software 2024
Durham, United Kingdom, 22-25/7/2024

Sparse Triangular Decomposition Based on Chordal Graphs
Polynomial Computer Algebra 2023
St. Petersburg, Russia, 2-7/05/2023

Analyses and Implementations of Chordality-preserving Top-down Algorithms for Triangular Decomposition
24th International Workshop on Computer Algebra in Scientific Computing
Gebze, Turkey, 22-26/08/2022

Exploiting Variable Sparsity in Computing Equilibria of Biological Dynamical Systems by Triangular Decomposition

8th International Conference on Algorithms for Computational Biology Missoula, USA, 9-11/11/2021

Simple Decomposition and Simple Characteristic Decomposition

Workshop in Honor of Vladimir Gerdt St. Petersburg, Russia, 18/07/2021

On the Chordality of Ordinary Differential Triangular Decomposition in Top-down Style

45th International Symposium on Symbolic and Algebraic Computation Athens, Greece, 20-23/07/2020

On the Chordality of Simple Decomposition in Top-down Style

8th International Conference on Mathematical Aspects of Computer and Information Sciences
Gebze-Istanbul, Turkey, 13-15/11/2019

On Berlekamp–Massey and Berlekamp–Massey–Sakata Algorithms

The 21st International Workshop on Computer Algebra in Scientific Computing
Moscow, Russia, 26-30/08/2019

On Parametric GCD

6th International Congress on Mathematical Software South Bend, USA, 24-27/07/2018

On the Chordality of Polynomial Sets in Triangular Decomposition in Top-Down Style

43th International Symposium on Symbolic and Algebraic Computation New York, USA, 16-19/07/2018

Symbolic Detection of Steady States of Autonomous Differential Biological Systems by Transformation into Block Triangular Form

5th International Conference on Algorithms for Computational Biology Hong Kong, China, 25-26/06/2018

Decomposing Polynomial Sets Simultaneously into Gröbner Bases and Normal Triangular Sets

19th International Workshop on Computer Algebra in Scientific Computing Beijing, China, 18-22/09/2017

Epsilon 1: A Software Library for Triangular Decomposition

5th International Congress on Mathematical Software Berlin, Germany, 11-14/07/2016

Reconstructing Chemical Reaction Networks by Solving Boolean Polynomial Systems

5th International Conference on Mathematical Aspects of Computer and Information Sciences
Nanning, China, 11-13/12/2013

Fast Algorithm for Change of Ordering of Zero-dimensional Gröbner Bases with Sparse Multiplication Matrices

36th International Symposium on Symbolic and Algebraic Computation San Jose, USA, 8-11/06/2011

STUDENT SUPERVISION

Individual Supervision (in Beihang University, China / all graduate students unless otherwise stated)

Yang Bai (2016–2018), Xiaolin Fan (2017–2019), Jiahua Lai (2017–2019), Zhaoji Wang (2018–2020), Haoyu Cao (2018–2020), Wenwen Ju (2019–2021), Mingyu Dong (2020–2022), Qiuye Song (Graduate-Doctoral, 2021–), Kaijian Zhang (2021–2023), Yutong Zhou (2022–), Xinyi Yang (2022–), Yangyang Liu (2023–), Yuan Song (Graduate-Doctoral, 2023–), Jiabai Wang (2024–)

Joint Supervision (with Prof. Dongming Wang in Beihang University, China)

Farkhanda Afzal (PhD, 2006–2012), Rina Dong (PhD, 2015–2020), Zhe Wang (Graduate, 2015–2018), Pengcheng Peng (Graduate, 2016–2019), Zongrong Li (Graduate, 2019–2021), Linpeng Wang (Graduate-Doctoral, 2020–), Zhaoxing Qi (Graduate-Doctoral, 2020–), Weifeng Shang (Graduate-Doctoral, 2021–)

COURSES

- **Computer Algebra:** Undergraduate/Graduate in Mathematics, *Beihang University, China*, since 2018

- **Information and Coding Theory:** Undergraduate in Mathematics, *Beihang University, China*, since 2014
- **Short Course on Symbolic Computation and its Applications:** Undergraduate/Graduate in Mathematics, *Beijing Normal University, China*, April–May 2023
- **Probability Theory:** Undergraduate in Engineering, *Beihang University, China*, 2013–2017

PUBLICATIONS

Books

- [1] D. Wang, **C. Mou**, X. Li, J. Yang, M. Jin, and Y. Huang. *Polynomial Algebra* (in Chinese), Higher Education Press, Beijing, 2011

Journal Papers

- [2] L. Wang and **C. Mou**. Simple Characteristic Decomposition of Polynomial Sets. *Journal of Systems Science and Complexity*, to appear
- [3] **C. Mou** and W. Ju. Sparse triangular decomposition for computing equilibria of biological dynamic systems based on chordal graphs. *IEEE/ACM Transactions on Computational Biology and Bioinformatics*, 2023, 20(3): 1667–1678
- [4] **C. Mou**, Y. Bai, and J. Lai. Chordal graphs in triangular decomposition in top-down style. *Journal of Symbolic Computation*, 2021, 102: 108–131
- [5] D. Wang, R. Dong, and **C. Mou**. Characteristic decomposition of polynomial sets (in Chinese). *SCIENTIA SINICA Mathematica*, 2021, 51(1): 67
- [6] D. Wang, R. Dong, and **C. Mou**. Decomposition of polynomial sets into characteristic pairs. *Mathematics of Computation*, 2020, 89: 1993–2015
- [7] **C. Mou** and D. Wang. Characteristic decomposition: From regular sets to normal sets. *Journal of Systems Science and Complexity*, 2019, 32(1): 37–46
- [8] J.-C. Faugère and **C. Mou**. Sparse FGLM algorithms. *Journal of Symbolic Computation*, 2017, 80(3): 538–569
- [9] W. Niu, J. Shi, and **C. Mou**. Analysis of codimension 2 bifurcations for high-dimensional discrete systems using symbolic computation methods. *Applied Mathematics and Computation*, 2016, 273: 934–947
- [10] **C. Mou** and W. Niu. Application of triangular set methods to detection of steady states and their numbers for finite biological models (in Chinese). *Computer Applications and Software*, 2014, 31(1): 278–282
- [11] **C. Mou**, D. Wang, and X. Li. Decomposing polynomial sets into simple sets over finite fields: The positive-dimensional case. *Theoretical Computer Science*, 2013: 468: 102–113
- [12] **C. Mou**. Design of termination criterion of BMS algorithm for lexicographical ordering (in Chinese). *Journal of Computer Applications*, 2012, 32(11): 2977–2980
- [13] X. Li, **C. Mou**, W. Niu, and D. Wang. Stability analysis for discrete biological models using algebraic methods. *Mathematics in Computer Science*, 2011, 5: 247–262
- [14] X. Li, **C. Mou**, and D. Wang. Decomposing polynomial sets into simple sets over finite fields: The zero-dimensional case. *Computers and Mathematics with Applications*, 2010, 60: 2983–2997

Conference Papers

- [15] **C. Mou**, Q. Song, and Y. Zhou. DetGB: A software package for computing Gröbner bases of determinantal ideals. *Proceedings of the International Congress on Mathematical Software 2024*, Durham, United Kingdom, 2024

- [16] Z. Qi and **C. Mou**. Complexity analysis of triangular decomposition over F_2 with strongly chordal graphs. *Proceedings of the 49th International Symposium on Symbolic and Algebraic Computation*, Raleigh, NC, USA, 2024
- [17] M. Dong and **C. Mou**. Analyses and implementations of chordality-preserving top-down algorithms for triangular decomposition. *Proceedings of the 24th International Workshop on Computer Algebra in Scientific Computing*, Gebze, Turkey, 2022
- [18] W. Shang, **C. Mou**, and D. Kapur. Algorithms for testing membership in univariate quadratic modules over the reals. *Proceedings of the 47th International Symposium on Symbolic and Algebraic Computation*, Lille, France, 2022
- [19] W. Ju and **C. Mou**. Exploiting variable sparsity in computing equilibria of biological dynamical systems by triangular decomposition. *Proceedings of the 8th International Conference on Algorithms for Computational Biology*, Missoula, USA, 2021
- [20] R. Dong, D. Lu, **C. Mou**, and D. Wang. Comprehensive characteristic decomposition of parametric polynomial systems. *Proceedings of the 46th International Symposium on Symbolic and Algebraic Computation*, Saint Peterburg, Russia, 2021
- [21] **C. Mou**, W.-T. Tsai, X. Jiang, and D. Yang. Game-theoretic analysis on CBDC adoption. *Proceedings of 2020 BenchCouncil Federated Intelligent Computing and Block Chain Conference*, Qingdao, China, 2020
- [22] **C. Mou**. On the chordality of ordinary differential triangular decomposition in top-down style. *Proceedings of the 45th International Symposium on Symbolic and Algebraic Computation*, Kalamata, Greece, 2020
- [23] **C. Mou** and J. Lai. On the chordality of simple decomposition in top-down style. *Proceedings of the 8th International Conference on Mathematical Aspects of Computer and Information Sciences*, Gebze-Istanbul, Turkey, 2019
- [24] **C. Mou** and X. Fan. On Berlekamp–Massey and Berlekamp–Massey–Sakata algorithms. *Proceedings of the 21st International Workshop on Computer Algebra in Scientific Computing*, Moscow, Russia, 2019
- [25] R. Dong and **C. Mou**. On characteristic decomposition and quasi-characteristic decomposition. *Proceedings of the 21st International Workshop on Computer Algebra in Scientific Computing*, Moscow, Russia, 2019
- [26] P. Peng, **C. Mou**, and W.-T. Tsai. Game-theoretic analysis on the number of participants in the software crowdsourcing contest. *Proceedings of the 13th International Conference on Artificial Intelligence and Symbolic Computation*, Suzhou, China, 2018
- [27] **C. Mou** and Y. Bai. On the chordality of polynomial sets in triangular decomposition in top-down style. *Proceedings of the 43th International Symposium on Symbolic and Algebraic Computation*, New York, USA, 2018
- [28] **C. Mou**. Symbolic detection of steady states of autonomous differential biological systems by transformation into block triangular form. *Proceedings of the 5th International Conference on Algorithms for Computational Biology*, Hongkong, China, 2018
- [29] R. Dong and **C. Mou**. Decomposing polynomial sets simultaneously into Gröbner bases and normal triangular sets. *Proceedings of the 19th International on Algebra in Scientific Computing*, Beijing, China, 2017
- [30] **C. Mou** and W. Niu. Reconstructing chemical reaction networks by solving Boolean polynomial systems. *Proceedings of the 5th International Conference on Mathematical Aspects of Computer and Information Sciences*, Nanning, China, 2013
- [31] J.-C. Faugère and **C. Mou**. Fast algorithm for change of ordering of zero-dimensional Gröbner bases with sparse multiplication matrices. *Proceedings of the 36th International Symposium on Symbolic and Algebraic Computation*, New York, USA, 2011

- [32] X. Li, **C. Mou**, W. Niu, and D. Wang. Stability analysis for discrete biological models using algebraic methods. *International Conference on Mathematical Aspects of Computer and Information Sciences 2009*, Fukuoka, Japan, 2009

Miscellaneous

- [33] **C. Mou** and D. Wang. On W-characteristic sets of lexicographic Gröbner bases. *ACM Communications in Computer Algebra*, 52(4), 142–144.

Mathematics Popularization

World of Mathematics (Chinese Translation of “Cracking Mathematics” by Colin Beveridge), *Electronic Industry Press*, Beijing, 2019

Crazy STEM (Chinese Translation of “Key Concepts in STEM” published by Brown Bear Books), *Electronic Industry Press*, Beijing, 2021

REFERENCES

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