

## Dr. CHENQI MOU

Associate Professor  
School of Mathematical Sciences  
Beihang University, China

Office E403-7  
School of Mathematical Sciences, Beihang University  
GaoJiaoYuanNanSan Street No.9, ChangPing District  
Beijing 102206, China

Born on 14/11/1984  
Chenqi.Mou@buaa.edu.cn  
Chenqi.Mou@gmail.com  
Homepage: cmou.net

### 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 (Applied Mathematics / Theoretical Computer Science)

### HONORS

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

- 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

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

- 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**
- 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–), Yutong Zhou (2022–), Xinyi Yang (2022–)

**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, 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] 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

- [3] **C. Mou**, Y. Bai, and J. Lai. Chordal graphs in triangular decomposition in top-down style. *Journal of Symbolic Computation*, 2021, 102: 108–131
- [4] D. Wang, R. Dong, and **C. Mou**. Characteristic decomposition of polynomial sets (in Chinese). *SCIENTIA SINICA Mathematica*, 2021, 51(1): 67
- [5] D. Wang, R. Dong, and **C. Mou**. Decomposition of polynomial sets into characteristic pairs. *Mathematics of Computation*, 2020, 89: 1993–2015
- [6] **C. Mou** and D. Wang. Characteristic decomposition: From regular sets to normal sets. *Journal of Systems Science and Complexity*, 2019, 32(1): 37–46
- [7] J.-C. Faugère and **C. Mou**. Sparse FGLM algorithms. *Journal of Symbolic Computation*, 2017, 80(3): 538–569
- [8] 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
- [9] **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
- [10] **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
- [11] **C. Mou**. Design of termination criterion of BMS algorithm for lexicographical ordering (in Chinese). *Journal of Computer Applications*, 2012, 32(11): 2977–2980
- [12] 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
- [13] 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

- [14] 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
- [15] 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
- [16] 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
- [17] 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
- [18] **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
- [19] **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
- [20] **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
- [21] **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

- [22] 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
- [23] 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
- [24] **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
- [25] **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
- [26] 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
- [27] **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
- [28] 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
- [29] 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

- [30] **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

Dongming Wang, MAE  
 Professor at Beihang University, China / Research Director at CNRS, France  
 Institute of Artificial Intelligence  
 Beihang University  
 Beijing 100191, China  
 Dongming.Wang@cnrs.fr

Jean-Charles Faugère  
 Research Director at INRIA, France  
 UFR Ingénierie 919, LIP6  
 Boite courrier 169, 4, place Jussieu  
 F-75252 Paris Cedex 05, France  
 Jean-Charles.Faugere@inria.fr