Maodong Pan

Personal information

Gender: Male

Date of Birth: January 5, 1990

Birthplace: Dongtai City, Jiangsu Province, P.R. China

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Education

09/2012–06/2017 **Ph.D**. in School of Mathematical Sciences, University of Science and Technology of China, Hefei, Anhui, P.R. China. Thesis Advisor: Prof. Falai Chen

09/2008–06/2012 **B.Sc**. in School of Mathematical Sciences, Nanjing Normal University, Nanjing, Jiangsu, P.R. China.

Work Experience

01/2021– **Associate researcher and Special-term researcher**. in School of Mathematics, Nanjing University of Aeronautics and Astronautics, Nanjing, Jiangsu, P.R. China.

11/2023–12/2023 **Visiting professor**. in Institute of Applied Geometry, Johannes Kepler University Linz, Austria. Mentor: Prof. Bert Jüttler

07/2017–12/2020 **Postdoctoral researcher**. in School of Mathematical Sciences, University of Science and Technology of China, Hefei, Anhui, P.R. China. Mentor: Prof. Falai Chen

03/2020–09/2020 **Postdoctoral researcher**. in the group of "Geometry in Simulations", Johann Radon Institute for Computational and Applied Mathematics (RICAM), Austrian Academy of Sciences, Linz, Austria. Mentor: Prof. Bert Jüttler

03/2019–02/2020 **Postdoctoral researcher**. in Institute of Applied Geometry, Johannes Kepler University Linz, Austria. Mentor: Prof. Bert Jüttler

Research Interests

My basic research interest is in computer aided geometric design, computer graphics related subjects. More specifically, I am interested in the following research topics:

- CAD/CAE

- Computational Geometry
- Mesh Generation
- Geometric Deep Learning

Research Grants

- Theory Towards The Integration of Design, Analysis and Optimization for Complex Geometries and Its Applications. National Key R&D Program of China (No. 2024YFA1016300), 12/2024–11/2029, PI.
- Novel Modeling and Analysis Techniques for CAD/CAE Integration and Their Applications. Natural Science Foundation of China (No. 12471359), 01/2025–12/2028, PI.
- Theory and Algorithms for The Integration of Modeling, Analysis and Optimization. Jiangsu Excellent Young Scientists Fund (No. BK20250176), 09/2025–08/2028, PI.
- Integration of CAD/CAE. Fundamental Research Funds for the Central Universities (No. NE2025007), 01/2025–12/2026, PI.
- Key Geometric Computing Theory and Methods Towards The Integration of CAD/CAE. Ministry of Human Resources and Social Security (No. H20240844), 01/2024–12/2025, PI.
- Theory for The Integration of CAD/CAE/CAM. Fundamental Research Funds for the Central Universities (No. NP2024303), 01/2024–12/2025, PI.
- Automatic Precise Positioning and Line Drawing Modeling Technology for Aircraft Strength Test Loading Block. Aviation Industry Corporation of China, Ltd. (No. 20240009052001), 05/2024–10/2025, PI.
- The Integration of CAD/CAE and The Relevant Mathematical Problems. Fundamental Research Funds for the Central Universities (No. NS2023041), 01/2023–12/2024, PI.
- Ultra-large-scale Efficient Isogeometric Topology Optimization Method for Complex Design Domains. National Key R&D Program of China (No. 2022YFB3302900), 11/2022–10/2025, Participant.
- Efficient Matrix Assembly for Isogeometric Analysis and Its Applications. Natural Science Foundation of China (No. 12101308), 01/2022–12/2024, PI.
- The Study of Two Fundamental Problems in Isogeometric Analysis. Natural Science Foundation of Jiangsu Province (No. BK20210268), 07/2021–06/2024, PI.
- The Study of Constructing Novel IGA-suitable Volumetric Parameterizations for Complex Domains. Start-up Funds for Scientific Research of New Teachers, Nanjing University of Aeronautics and Astronautics (No. 90YAH21060), 05/2021–04/2023, PI.
- Research on Constructing High-quality Volumetric Parameterization Techniques for Isogeometric Analysis. Anhui Provincial Natural Science Foundation, PR China (No. 1908085QA11), 07/2019–06/2021, PI.
- The Study of Constructing Novel Analysis-suitable Volumetric Parameterizations of Complex Geometries. China Postdoctoral Science Foundation (No. 2018M632548), 06/2018–06/2020, PI.
- The Study of Applications of Low-rank and Compact Representations in Geometric Modeling. Fundamental Research Funds for the Central Universities (No. WK0010460007), 01/2018–12/2019, PI.
- Investigation on Construction of Low-rank Volumetric Parameterization Method for Isogeometric Analysis. Open Project Program of the State Key Lab of CAD&CG (No. A1819), Zhejiang University, 01/2018–12/2018, PI.

- Research on Surface Reconstruction, Mesh Segmentation and Parameterization Based on Sparse Representation. Natural Science Foundation of China (No. 61877056), 01/2019–12/2022, Core Participant.
- Investigation on Theory and Methods of Geometric Modeling for Isogeometric Analysis. Natural Science Foundation of China (No. 61972368), 01/2020–12/2023, Core Participant.

Publications

[1] Zheng Liu, Zhenyu Huang, **Maodong Pan***, and Ying He. Deterministic point cloud diffusion for denoising. *IEEE Transactions on Visualization and Computer Graphics*, accepted.

[2] Yan Shang, **Maodong Pan**, Song Cen, and Chenfeng Li. Challenges and advances in low-order finite elements for couple stress elasticity: A comprehensive review. *Archives of Computational Methods in Engineering*, accepted.

[3] Yan Shang, Shengfeng Wang, **Maodong Pan**, Song Cen, Bingbing Chen, and Chenfeng Li. Computational homogenization of non-centrosymmetric composites with concurrent flexoelectric and piezoelectric effects using consistent couple stress theory. *Composite Structures*, 376:119843, 2026.

[4] Yan Shang, Xiaojie Li, **Maodong Pan**, Song Cen, Bingbing Chen, and Chenfeng Li. Mesh-distortion immune trefftz element for flexoelectric kirchhoff plates within consistent couple stress theory. *International Journal for Numerical Methods in Engineering*, 126(22):e70179, 2025.

[5] Jian Wang, Yu Wang, Shanshan Ge, Ziwei Han, and **Maodong Pan***. Morphological dynamics analysis on 3d surface using the gray-scott model. *Computers and Mathematics with Applications*, 199:242–259, 2025.

[6] Ruijie Zou, **Maodong Pan***, Ye Zheng, Falai Chen, and Weihua Tong. Mat-parameterization: Volumetric multi-patch parameterizations of complex domains for isogeometric analysis using mat-based decomposition. *Computer Methods in Applied Mechanics and Engineering*, 445:118187, 2025.

[7] **Maodong Pan***, Ruijie Zou, and Bert Jüttler. Algorithms and data structures for C^s-smooth RMB-splines of degree $2s+1$. *Computer Aided Geometric Design*, 114:102389, 2024.

[8] Shanshan Zhang, **Maodong Pan**, and Falai Chen. Triangular Bézier patch based parameterization via quasi-conformal mapping. *Journal of Computer-Aided Design & Computer Graphics*, 36(12):1863–1869, 2024.

[9] **Maodong Pan**, Ruijie Zou, Weihua Tong, Yujie Guo, and Falai Chen. G^1-smooth planar parameterization of complex domains for isogeometric analysis. *Computer Methods in Applied Mechanics and Engineering*, 417, Part A:116330, 2023.

[10] Lisa Groiss, Bert Jüttler, and **Maodong Pan***. Local linear independence of bilinear (and higher degree) B-splines on hierarchical T-meshes. *Computer Aided Geometric Design*, 103:102190, 2023 (*Corresponding author).

[11] Yujie Guo, **Maodong Pan**, Xiaohui Wei, Fei Luo, Fangbin Sun, and Martin Ruess. Implicit dynamic buckling analysis of thin-shell isogeometric structures considering geometric

imperfections. *International Journal for Numerical Methods in Engineering*, 124:1055–1088, 2023.

[12] **Maodong Pan** and Falai Chen. Constructing planar domain parameterization with HB-splines via quasi-conformal mapping. *Computer Aided Geometric Design*, 97:102133, 2022.

[13] Sandra Merchel, Bert Jüttler, Dominik Mokriš, and **Maodong Pan***. Fast formation of matrices for least-squares fitting by tensor-product spline surfaces. *Computer-Aided Design*, 150:103307, 2022 (*Corresponding author).

[14] Ye Ji, Mengyun Wang, **Maodong Pan**, Yi Zhang, and Chungang Zhu. Penalty function-based volumetric parameterization method for isogeometric analysis. *Computer Aided Geometric Design*, 94:102081, 2022.

[15] **Maodong Pan***, Bert Jüttler, and Felix Scholz. Efficient matrix computation for isogeometric discretizations with hierarchical B-splines in any dimension. *Computer Methods in Applied Mechanics and Engineering*, 388:114210, 2022.

[16] **Maodong Pan***, Bert Jüttler, and Angelos Mantzaflaris. Efficient matrix assembly in isogeometric analysis with hierarchical B-splines. *Journal of Computational and Applied Mathematics*, 390:113278, 2021.

[17] **Maodong Pan**, Bert Jüttler, and Alessandro Giust. Fast formation of isogeometric Galerkin matrices via integration by interpolation and look-up. *Computer Methods in Applied Mechanics and Engineering*, 366:113005, 2020.

[18] **Maodong Pan**, Falai Chen, and Weihua Tong. Volumetric spline parameterization for isogeometric analysis. *Computer Methods in Applied Mechanics and Engineering*, 359:112769, 2020.

[19] Weihua Tong*, Xiankang Yang*, **Maodong Pan**, and Falai chen. Spectral mesh segmentation via ℓ_0 gradient minimization. *IEEE Transactions on Visualization and Computer Graphics*, 26(4):1807–1820, 2020 (*Joint first authors).

[20] Yufeng Tian and **Maodong Pan**. Corner-cutting subdivision surfaces of general degrees with parameters. *Journal of Computational Mathematics*, 38(5):732–747, 2020.

[21] Bert Jüttler, Alessandro Giust, and **Maodong Pan**. Some remarks on integration by interpolation and look-up. *Oberwolfach Reports*, 16(3):1981–2032, 2020.

[22] Xiankang Yang, **Maodong Pan**, and Weihua Tong. Feature lines extraction on meshes using ℓ_0 minimization. *Computer Engineering*, 45(7):251–257, 2019.

[23] **Maodong Pan*** and Falai Chen. Low-rank parameterization of volumetric domains for isogeometric analysis. *Computer-Aided Design*, 114:82–90, 2019.

[24] Ye Zheng, **Maodong Pan***, and Falai Chen*. Boundary correspondence of planar domains for isogeometric analysis based on optimal mass transport. *Computer-Aided Design*, 114:28–36, 2019 (*Corresponding authors).

[25] **Maodong Pan**, Falai Chen, and Weihua Tong. Low-rank parameterization of planar domains for isogeometric analysis. *Computer Aided Geometric Design*, 63:1–16, 2018.

[26] **Maodong Pan**, Weihua Tong, and Falai Chen. Phase-field guided surface reconstruction based on implicit hierarchical B-splines. *Computer Aided Geometric Design*, 52-53(9):154–169, 2017.

[27] **Maodong Pan**, Weihua Tong, and Falai Chen. Compact implicit surface reconstruction via low-rank tensor approximation. *Computer-Aided Design*, 78(9):158–167, 2016.

[28] Zhao Liu, **Maodong Pan**, Zhouwang Yang, and Jiansong Deng. Recovery of sharp features in mesh models. *Communications in Mathematics and Statistics*, 3(2):263–283, 2015.

Prizes and Awards

- First Outstanding Young Scholar Incentive Program of CSIAM GDC
- Excellent Young Scientists Fund of Jiangsu Province
- Outstanding Young Teachers of the "Green and Blue Project" in Jiangsu Universities
- Champion of the 1st "Taihang Cup" Future Power Mathematics Innovation Competition
- Jiangsu Provincial Double-Innovation Doctor Program
- Jiangsu Society for Industrial and Applied Mathematics (JSIAM) Young Scholar Prize
- "Changkong Stars" of Nanjing University of Aeronautics and Astronautics
- Excellent Presentation Award of Annual Conference of JSIAM
- Nomination Award for Outstanding Student Union Mentor at Nanjing University of Aeronautics and Astronautics
- Special Prize in Graduate Course Teaching Innovation Competition of Nanjing University of Aeronautics and Astronautics
- The Third Prize of the 10th Jiangsu Province University Young Teachers' Mathematics Basic Course Teaching Competition
- Award for Excellent Practice Guidance of Nanjing University of Aeronautics and Astronautics
- Outstanding Guidance Award for Undergraduate Academic Forum of Nanjing University of Aeronautics and Astronautics
- Outstanding Class Advisor of Nanjing University of Aeronautics and Astronautics

Teaching activities

- Mathematical Modeling, Spring 2026.
- Linear Algebra, Autumn 2025.
- Advanced Engineering Mathematics, Autumn 2025.
- Linear Algebra, Spring 2025.
- Linear Algebra, Autumn 2024.
- Advanced Engineering Mathematics, Autumn 2024.
- Numerical Methods, Spring 2024.
- Linear Algebra, Autumn 2023.
- Advanced Engineering Mathematics, Autumn 2023.
- Numerical Methods, Spring 2023.
- Advanced Engineering Mathematics, Autumn 2022.
- Numerical Methods, Autumn 2022.

- Computational Geometry, Spring 2022.
- Numerical Methods, Spring 2022.
- Advanced Engineering Mathematics, Fall 2021.

Invited presentations

- "Domain parameterization, Matrix assembly and RMB-splines for Isogeometric analysis", International Symposium on 25 Years of Applied Geometry at JKU, Linz, Austria, September 24, 2025.
- "Domain parameterization for isogeometric analysis", University of Groningen, Groningen, The Netherlands, September 17-19, 2025.
- "Algorithms, data structures and applications for C^s-smooth RMB-splines of degree $2s+1$", The Thirteenth International Conference on Isogeometric Analysis (IGA2025), Eindhoven, The Netherlands, September 14-17, 2025.
- "Volumetric multi-patch parameterizations of complex domains for isogeometric analysis", Frontiers on Geometric Design, Physical Simulation and Their Integration, Tianyuan Mathematics Research Center, Kunming, July 20-26, 2025.
- "Theory Towards The Integration of Design, Analysis and Optimization for Complex Geometries and Its Applications", The Launching Conference of National Key R&D Program Youth Scientist Project, Nanjing, China, April 29, 2025.
- "The Key Geometric Computing Theory towards the Integration of CAD/CAE", Online Talk, North China University of Water Resources and Electric Power, Zhengzhou, China, December 28, 2024.
- "The Key Geometric Computing Theory and Methods towards the Integration of CAD/CAE", The 5th Jiangsu Engineer Conference, Nanjing, China, December 19, 2024.
- "Integrated Framework for Design, Analysis and Optimization of Complex Geometric Models", Young Scholars Academic Forum of Jiangsu Computational Mathematics Association, Nanjing, December 13-15, 2024.
- "Surface Reconstruction and Domain Parameterization Techniques for Complex Geometries", Nanjing University of Information Science and Technology, Nanjing, September 14, 2024.
- "Efficient Matrix Assembly for Isogeometric Analysis", Nanjing Normal University, Nanjing, August 13, 2024.
- "The Key Geometric Computing Theory and Methods towards the Integration of CAD/CAE", The 7th "Striving for Strength" Young Scientists Forum of the China Graphics Society, Dalian, July 19-21, 2024.
- "The Key Geometric Computing Theory and Methods towards the Integration of CAD/CAE", 2024 Jiangsu Provincial Congress on Computer, Nanjing, June 14-16, 2024.
- "Isogeometric analysis and related mathematical problems", 2023 Annual Meeting of the Chinese Mathematical Society, Dalian, December 22-26, 2023.
- "The Key Geometric Computing Theory towards the Integration of CAD/CAE", 2023 Jiangsu Provincial Congress on Industrial and Applied Mathematics, **Plenary talk**, Nanjing, December 22-24, 2023.
- "Efficient Matrix Assembly for Isogeometric Analysis", Workshop on Isogeometric Analysis and Finite Element Method, Tianyuan Mathematical Center, Changchun, July 20-22, 2023.

- "Sum-factorization Techniques in Isogeometric Analysis", 13rd National Congress on Computational Mathematics, Nanjing, July 15-19, 2023.
- "Domain Parameterization and Efficient Matrix Assembly for Isogeometric Analysis", 13rd National Congress on Computer Mathematics, **Plenary talk**, Dalian, June 15-18, 2023.
- "The integration of CAD/CAE and related mathematical problems", 2023 Jiangsu Provincial Congress on Computational Mathematics, **Plenary talk**, Yancheng, May 26-28, 2023.
- "The integration of CAD/CAE and related mathematical problems", The 20th National Symposium on Numerical Methods of Fluid Mechanics, Nanjing, March 31-April 2, 2023.
- "Fast Formation of Matrices for Least-Squares Fitting by Tensor-Product Spline Surfaces", Symposium on Solid and Physical Modeling, Singapore, June 27-29, 2022, Online Talk.
- "Efficient Matrix Computation for Isogeometric Discretizations with Hierarchical B-splines in Any Dimension", Virtual International Conference on Isogeometric Analysis, Lyon, France, September 26-29, 2021, Online Talk.
- "Planar Domain Parameterization with Hierarchical B-splines", 16th U.S. National Congress on Computational Mechanics, July 25-29, 2021, Online Talk.
- "Fast Formation of Matrices in Isogeometric Analysis", Workshop on the Theory and Application of Isogeometric Analysis, Tianyuan Mathematical Center, Jilin University, Changchun, China, July 20-22, 2021.
- "Efficient Matrix Assembly in Isogeometric Analysis", Soochow University, Suzhou, China, May 11, 2021.
- "Domain Parameterization for Isogeometric Analysis", Nanjing Center for Applied Mathematics, Nanjing, China, April 29, 2021.
- "Domain Parameterization for Isogeometric Analysis", Online Talk, South China University of Technology, Guangzhou, China, November 20, 2020.
- "Fast Formation of Isogeometric Galerkin Matrices via Integration by Interpolation and Look-up", 2nd workshop of the ERC project CHANGE, Sestri Levante, (GE), Italy, November 25-27, 2019.
- "Integration by Interpolation, Look-up and Sum Factorization for Galerkin-based Isogeometric Analysis", 15th NFN seminar, bifeb, Strobl, Austria, October 1–3, 2019.
- "Low-rank Parameterization of Volumetric Domains for Isogeometric Analysis", Symposium on Solid and Physical Modeling 2019, Simon Fraser University, Vancouver, Canada, June 17–21, 2019.
- "Volumetric Spline Parameterization for Isogeometric Analysis", SIAM Conference on Computational Geometric Design 2019, Simon Fraser University, Vancouver, Canada, June 17–21, 2019.
- "Phase-field Guided Surface Reconstruction Based on Implicit Hierarchical B-splines", International Conference on Geometric Modeling and Processing 2017, Xiamen, P.R. China, April 17–19, 2017.
- "Compact Implicit Surface Reconstruction via Low-rank Tensor Approximation", The International Geometry Summit 2016, Freie Universität Berlin, Berlin, Germany, June 20–24, 2016.
- "A Low-rank Surface Reconstruction Algorithm Based on Hierarchical Implicit Tensor-product B-spline Surfaces", 7th National Congress on Computer Mathematics, University of Science and Technology of China, Hefei, P.R. China, October 30–November 2, 2015.

Refereeing activities

- SIAM Journal on Numerical Analysis
- Computer Methods in Applied Mechanics and Engineering
- International Journal for Numerical Methods in Engineering
- Computer-Aided Design
- Computer Aided Geometric Design
- Journal of Computational Physics
- IEEE Computer Graphics and Applications
- Graphical Models
- Mathematics and Computers in Simulation
- Journal of Computational and Applied Mathematics
- Applied Numerical Mathematics
- Computers & Graphics
- The Visual Computer
- Advances in Engineering Software
- Computers & Mathematics with Applications
- Communications in Mathematics and Statistics
- Journal of Computational Design and Engineering
- Computer Modeling in Engineering & Sciences
- Journal of Systems Science & Complexity
- Mathematics

Computer skills

C, C++, MATLAB, OpenGL...

References

- Falai Chen, University of Science and Technology of China, Email: chenfl@ustc.edu.cn
- Bert Jüttler, Johannes Kepler University Linz, Email: bert.juettler@jku.at