

Maodong Pan



Personal information

Gender: Male
Date of Birth: January 5, 1990
Birthplace: Dongtai City, Jiangsu Province, P.R. China
Office Address: School of Mathematics, Nanjing University of Aeronautics and Astronautics, Jiangjun Road 29, Nanjing City, Jiangsu Province, P.R. China
Mobile: +86 13866744168
E-mail: mdpan@mail.ustc.edu.cn; maodong@nuaa.edu.cn

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 professor.** 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

- Novel Modeling and Analysis Techniques for CAD/CAE Integration and Their Applications. Natural Science Foundation of China (No. 12471359), 01/2025–12/2028, 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.
- The Study of Constructing Novel Analysis-suitable Volumetric Parameterizations of Complex Geometries. China Postdoctoral Science Foundation (No. 2018M632548), 06/2018–06/2020, 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 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] **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.
- [2] **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.

- [3] 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).
- [4] 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.
- [5] **Maodong Pan** and Falai Chen. Constructing planar domain parameterization with HB-splines via quasi-conformal mapping. *Computer Aided Geometric Design*, 97:102133, 2022.
- [6] 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).
- [7] 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.
- [8] **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.
- [9] **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.
- [10] **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.
- [11] **Maodong Pan**, Falai Chen, and Weihua Tong. Volumetric spline parameterization for isogeometric analysis. *Computer Methods in Applied Mechanics and Engineering*, 359:112769, 2020.
- [12] 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).
- [13] Yufeng Tian and **Maodong Pan**. Corner-cutting subdivision surfaces of general degrees with parameters. *Journal of Computational Mathematics*, 38(5):732–747, 2020.
- [14] Bert Jüttler, Alessandro Giust, and **Maodong Pan**. Some remarks on integration by interpolation and look-up. *Oberwolfach Reports*, 16(3):1981–2032, 2020.
- [15] Xiankang Yang, **Maodong Pan**, and Weihua Tong. Feature lines extraction on meshes using ℓ_0 minimization. *Computer Engineering*, 45(7):251–257, 2019.
- [16] **Maodong Pan*** and Falai Chen. Low-rank parameterization of volumetric domains for isogeometric analysis. *Computer-Aided Design*, 114:82–90, 2019.

- [17] 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).
- [18] **Maodong Pan**, Falai Chen, and Weihua Tong. Low-rank parameterization of planar domains for isogeometric analysis. *Computer Aided Geometric Design*, 63:1–16, 2018.
- [19] **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.
- [20] **Maodong Pan**, Weihua Tong, and Falai Chen. Compact implicit surface reconstruction via low-rank tensor approximation. *Computer-Aided Design*, 78(9):158–167, 2016.
- [21] 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

- 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

Teaching activities

- 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

- "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
- Journal of Computational and Applied Mathematics
- Applied Numerical Mathematics
- The Visual Computer
- Computers & Mathematics with Applications
- 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