



Research Profile

Mathematical modeler and numerical analyst specializing in **geometry-aware discretization** and **isogeometric analysis (IGA)**. My research develops **mathematically robust CAD-to-CAE frameworks** that ensure consistency between geometric representation, parameterization, discretization, and numerical analysis for complex physical and engineering systems. Key themes include **PDE-based parameterization**, **injectivity/regularity guarantees**, **multi-sided and multi-patch spline parameterizations**, and **fast solvers** (e.g., preconditioned Anderson acceleration). I am currently a reviewer for **Mathematical Reviews (AMS)**.

Research Highlights

- **Analysis-suitable parameterization for Isogeometric Analysis:** optimization-based and PDE-based volumetric constructions with parameterization quality control for complex domains.
- **Geometry-to-simulation pipelines:** boundary parameter matching (including Schwarz–Christoffel tools) and multi-sided domain parameterizations enabling reliable IGA workflows.
- **Solver acceleration:** preconditioned Anderson acceleration to improve efficiency and robustness of parameterization Partial Differential Equation (PDE) solvers.
- **Industrial-grade spline meshing:** spline-based structured mesh generation technology for screw machine simulations (SplineMesh / ScorgTM).

Academic Positions

01/2024– Present **Postdoctoral Researcher**, *Delft University of Technology*, Department of Applied Mathematics, Numerical Analysis, The Netherlands.

Education

2019–2023 **Ph.D. Mathematics**, *Dalian University of Technology*, School of Mathematical Sciences, China.

2017–2019 **M.Sc. Mathematics**, *Dalian University of Technology*, School of Mathematical Sciences, China.

2013–2017 **B.Sc. Mathematics**, *Dalian University of Technology*, School of Mathematical Sciences, China.

Research Experience

10/2021– 12/2023 **Visiting Ph.D. Researcher**, *Delft University of Technology*, Department of Applied Mathematics, Numerical Analysis, The Netherlands.

Selected Peer-reviewed Publications

- 2025 Y. Yang, **Y. Ji**, M. Möller, C. Ayas. **Computational efficient process simulation of geometrically complex parts in metal additive manufacturing**. *International Journal of Heat and Mass Transfer*, 248 (2025), 127059.
- 2025 L. Yang, W. Wang, **Y. Ji**, C.-G. Zhu, C.-C. Wang. **Spacetime isogeometric topology optimization with additive manufacturing constraints**. *Computer Methods in Applied Mechanics and Engineering*, 441 (2025), 117976.
- 2024 **Ye Ji**, Matthias Möller, Ying-Ying Yu, Chun-Gang Zhu. **Boundary parameter matching for isogeometric analysis using Schwarz–Christoffel mapping**. *Engineering with Computers*, 1–19 (2024).
- 2023 **Ye Ji**, Kewang Chen, Matthias Möller, Cornelis Vuik. **Improved PDE-based elliptic parameterization for IGA using preconditioned Anderson acceleration**. *Computer Aided Geometric Design*, 102 (2023), 102190. (GMP 2023 Best Paper Award)

- 2023 **Ye Ji**, Meng-Yun Wang, Ying-Ying Yu, Chun-Gang Zhu. **Curvature-based r-adaptive IGA with injectivity-preserving multi-sided domain parameterization** *Journal of Systems Science & Complexity*, 36 (2023), 53–76.
- 2022 **Ye Ji**, Meng-Yun Wang, Yu Wang, Chun-Gang Zhu. **Curvature-based r-adaptive planar NURBS parameterization method for isogeometric analysis using bi-level approach.** *Computer Aided Design*, 150 (2022), 103305.
- 2022 **Ye Ji**, Meng-Yun Wang, Mao-Dong Pan, Yi Zhang, Chun-Gang Zhu. **Penalty function-based volumetric parameterization method for isogeometric analysis.** *Computer Aided Geometric Design*, 94 (2022), 102075.
- 2021 **Ye Ji**, Ying-Ying Yu, Meng-Yun Wang, Chun-Gang Zhu. **Constructing high-quality planar NURBS parameterization for isogeometric analysis by adjustment control points and weights.** *Journal of Computational and Applied Mathematics*, 396 (2021), 113615.
- 2021 Ying-Ying Yu, **Ye Ji**, Jing-Gai Li, Chun-Gang Zhu. **Conditions for injectivity of toric volumes with arbitrary positive weights** *Computers & Graphics*, 97 (2021), 88–98. (CAD/Graphics 2021 Best Paper Award)

Selected Talks

Delivered **30+** invited and conference presentations; selected highlights below.

- Oct. 2025 **Invited Talk**, *Analysis-suitable parameterization for Isogeometric Analysis*, Institut für Leichtbau und Struktur-Biomechanik, TU Wien, Vienna, Austria.
- Sep. 2025 **Oral**, *IGA-LBM: Isogeometric lattice Boltzmann method*, IGA 2025, Eindhoven, Netherlands.
- Sep. 2025 **Short Course**, *SplineMesh v2.0: Spline Mesh technology for screw machines*, Short Course & Forum on CFD in Rotary Machines, London, United Kingdom.
- Sep. 2024 **Oral**, *Structured mesh generation for screw machines simulations*, International Conference on Screw Machines 2024, Dortmund, Germany.
- Jun. 2024 **Oral**, *IGA-suitable parameterization for complex fluid simulations*, ECCOMAS Congress 2024, Lisboa, Portugal.
- Sep. 2023 **Oral**, *Spline-based parameterization using preconditioned Anderson acceleration*, Compressors and their Systems, London, United Kingdom.
- Jul. 2023 **Oral**, *PDE-based parameterization for IGA with preconditioned Anderson acceleration*, GMP 2023, Genova, Italy.
- Jun. 2023 **Oral**, *Fast and robust solvers for local/global domain parameterizations within G+Smo*, IGA 2023, Lyon, France.

Teaching, Mentoring, and Supervision

- Lecturer** Co-developer and lecturer of a graduate special course on **Isogeometric Analysis** at TU Delft (Q3–Q4 2026), jointly prepared with Prof. Matthias Möller (TU Delft) and Prof. Stefanie Elgeti (TU Wien); covering geometry-aware discretisation and advanced numerical methods for IGA.
- Supervision** Supervision/co-supervision of PhD and Master’s research in IGA and spline geometry. *Examples:* (i) PhD co-supervision (TU Delft) on semi-analytical IGA for thermal/process simulation in metal additive manufacturing (resulting in IJHMT 2025); (ii) multiple MSc/PhD projects on multi-sided parameterization, extended IGA, and spline approximation.

Research Software and Infrastructure

- **G+Smo (Geometry + Simulation Modules)**: member of the core development team of the open-source C++ IGA library, supporting geometry processing, discretization, and simulation workflows.
- **SplineMesh / ScorgTM**: lead developer of spline-based structured mesh generation modules for industrial modeling (screw machines), focusing on robustness, quality, and integration with simulation pipelines.

Service and Professional Activities

- Refereeing** Reviewer for *Computer-Aided Design*, *Computer Aided Geometric Design*, *Scientific Reports*, *Engineering with Computers*, *Advances in Engineering Software*, *Finite Elements in Analysis & Design*.

- 2022–Now Reviewer for **Mathematical Reviews**, American Mathematical Society.
- 2020–Now Life member, China Society for Industrial and Applied Mathematics (CSIAM).

Honors and Awards (Selected)

- 2025 Conference Best Paper Award, CSIAM GDC 2025 (China Society for Industrial and Applied Mathematics Geometric Design and Computing Conference; major national conference in geometric design and computing, Yantai, China).
- 2024 Conference Best Paper Award, ICSM 2024 (International Conference on Screw Machines; international research conference on screw machine technology, TU Dortmund, Germany).
- 2023 Conference Best Paper Award, GMP 2023 (Geometric Modeling and Processing Symposium; leading international conference on geometric modeling and processing, Genova, Italy).
- 2023 Best Team Award, AWS Challenge at the SIAM Hackathon 2023 (international team-based hackathon in computational science, associated with SIAM CSE23, Amsterdam, Netherlands).
- 2022 & 2016 National Scholarship (twice), Ministry of Education of China (national award for outstanding academic and research achievement; awarded to approximately 0.2% of students nationwide).
- 2021 Conference Best Paper Award, CAD/Graphics 2021 (International Conference on Computer-Aided Design and Computer Graphics; peer-reviewed conference on CAD, graphics, and visualization, Xian, China).

Skills

- Programming C/C++ (modern CMake-based projects), Python (scientific computing), MATLAB, Julia, \LaTeX .
- Numerical Methods Partial Differential Equations, Finite Element Methods, Isogeometric Analysis, Structured Grid Generation.
- Geometry & Modeling B-splines and NURBS, Parametric Curves/Surfaces, Mesh Generation, Geometric Mapping and Regularity Analysis.
- Languages Mandarin (native), English (fluent).