

Xiangmin (Jim) Jiao, Ph.D.

Department of Applied Mathematics & Statistics and
Institute for Advanced Computational Science
Stony Brook University
Stony Brook, NY 11794-3600

Phone: (631) 632-4408
Email: xiangmin.jiao@stonybrook.edu
URL: <http://www.ams.stonybrook.edu/~jiao>

RESEARCH INTERESTS

Numerical and geometric computing in science and engineering, including numerical linear algebra, numerical partial differential equations, applied computational geometry and topology, and high-performance computing. Specialize in high-order discretization methods, dynamic surfaces, scalable multilevel preconditioners and solvers, multi-physics coupling, and problem solving environments. Application areas include computational fluid dynamics, climate modeling, biomedical engineering, fluid-structure interactions, and geometric modeling.

EDUCATION

Ph.D.	Computer Science University of Illinois at Urbana-Champaign (UIUC). GPA: 4.0/4.0. Adviser: Prof. M. T. Heath Dissertation: <i>Data Transfer and Interface Propagation in Multicomponent Simulations</i>	2001
M.S.	Computer Science University of California at Santa Barbara (UCSB)	1997
B.S.	Computer Science Peking (Beijing) University, China	1995

RESEARCH & TEACHING POSITIONS

Associate Professor , Department of Applied Mathematics & Statistics and Institute for Advanced Computational Science, Stony Brook University	09/2011–present
Assistant Professor , Department of Applied Mathematics and Statistics, Stony Brook University	08/2007–08/2011
Assistant Professor , College of Computing, Georgia Tech	08/2005–08/2007
Research Scientist , Computational Science and Engineering, UIUC	08/2001–08/2005
Research Assistant , Computational Science and Engineering, UIUC	01/1998–08/2001
Givens Research Associate , Argonne National Laboratory	Summer 1998
Research Assistant , Department of Computer Science, UCSB	01/1997–08/1997

TEACHING EXPERIENCE

Primary Instructor,

Numerical Analysis I (Numerical Linear Algebra), Fall 2007–2012,2014-2015,2018-2021, SBU
 Numerical Analysis II, Spring 2009–2016,2018–2019,2022 SBU
 Introduction to Computational Science (Spring 2018–2019, 2021–2022, co-taught with Prof. R. Harrison)
 Fundamentals of Computing (Fall 2016–2019)
 Computing & Programming Fundamentals in AMS, Fall 2021, SBU
 Ordinary Differential Equations and Boundary Value Problems, Fall 2010, 2011, SBU
 Finite Element Methods: Theory and Computation, Fall 2017,2020
 Applied Calculus III, Fall 2009 & 2012, Spring 2010–2012, SBU
 Special Topics in Computational Mathematics, Spring 2008, SBU
 Foundations of Modeling and Simulation, Spring 2007, Georgia Tech (co-taught with Prof. Fujimoto)
 Languages and Computation Fall 2006, Georgia Tech
 Languages and Computation, Summer 2006, Georgia Tech
 Design & Analysis of Algorithms, Spring 2006, Georgia Tech

GRANTS

PI:	Subcontract from Argonne National Laboratory (pending) \$500,000, on model integration and numerical coupling in E3SM.	09/2022–08/2027
PI:	Subcontract from Los Alamos National Laboratory \$500,000, on adaptive remapping for multiphysics coupling on next-generation architectures	01/2018–08/2022
PI:	IACS Seed Grant \$29,120, on Leveraging Data-Sparsity for Efficient and Robust Chemical Simulations of Materials for a Sustainable Future (with B. Levine)	06/2021–08/2022
PI:	Subcontract from Argonne National Laboratory \$115,441, on parallel mesh adaptation with array-based mesh database	07/2015–06/2016
Co-PI:	DoD Army Research Office \$361,251 on mathematical models and advanced numerical methods for complex flows and structures (PI: J. Glimm)	07/2013 – 06/2016
PI:	Army Research Office \$75,000 on deployment of high fidelity brittle fracture software for engineering design (PI: R. Samulyak)	07/2014 – 06/2015
Co-PI:	Army Research Office \$199,543, on computer hardware for studies of complex flows and structures (PI: J. Glimm)	07/2014 – 07/2015
PI:	Subcontract from Argonne National Laboratory \$80,000, Parallel Mesh Adaptation with Array-Based Mesh Database	07/2014 – 06/2015
Co-PI:	DoD Army Research Office \$376,630, on mixing, combustion, and other interface dominated flows (PI: J. Glimm)	07/2009 - 05/2013
PI:	NSF DMS \$300,021, on optimal cross parameterizations of surfaces (with H. Zha)	09/2007–08/2011
PI:	Subcontract from Pacific Northwest National Laboratory \$91,814, on geometric engine for multi-scale modeling of respiratory system	10/2010–06/2012
PI:	DoD Army Research Office \$15,000, for student and postdoctoral participant support for the 21st International Meshing Roundtable	07/2012-06/2013
Co-PI:	DOE \$600,000, on sharp interface tracking in rotating microflows of solvent extraction (PI: J. Glimm)	07/2009 - 09/2012

- Co-PI:** DoD Army Research Office 07/2009 - 05/2013
\$376,630, on mixing, combustion, and other interface dominated flows (PI: J. Glimm)
- Co-PI:** DOE 06/2010 - 06/2012
\$479,000, on two-way integration of WRF and CCSM for regional climate simulations (PI: W. Lin)
- Co-PI:** DoD-Army Research Office 2010
\$200,000, Parallel Computation of Free Surface Problems Using Front Tracking Library (PI: J. Glimm)
- PI:** Subcontract from Pacific Northwest National Laboratory 09/2008–12/2008
\$16,024, on mesh generation and shape analysis for biomedical computing
- PI:** Subcontract from University of Illinois 01/2006–05/2007
\$190,000, on correlating dynamic non-matching interfaces
- Co-PI:** NSF/DARPA Grant 0310446 05/2003–07/2006
\$898,293, co-PI with Profs. J. Hart, M. Heath, and J. Sullivan under NSF/DARPA CARGO program (Computational and Algorithmic Representations of Geometric Objects) on Lagrangian surface propagation

AWARDS

- Frey Family Foundation Professorship in Applied Mathematics, Stony Brook University 01/2021–12/2022
- Excellence in Teaching, Stony Brook University Fall 2016-2017, 2019–2021, Spring 2018, 2021
- Outstanding Instructor, Stony Brook University Fall 2010-2012, Spring 2013-2014
- David J. Kuck Outstanding Ph.D. Thesis Award, Computer Science, UIUC 2001
- Excellent Teaching Assistant Award, Computer Science, UIUC 1997

JOURNAL PUBLICATIONS AND BOOK CHAPTERS

1. Q. Chen and X. Jiao, HIFIR: Hybrid Incomplete Factorization with Iterative Refinement for Preconditioning Ill-conditioned and Singular Systems, *ACM Transactions on Mathematical Software*. 2022. DOI: 10.1145/3536165.
2. X. Jiao and Q. Chen, Approximate Generalized Inverses with Iterative Refinement for ϵ -Accurate Preconditioning of Singular Systems. *SIAM Journal on Matrix Analysis and Applications*, vol. 43(1), pp. 40–67, 2022. DOI: 10.1137/20M1364126.
3. X. Jiao, X. Wang, and Q. Chen, Optimal and Low-Memory Near-Optimal Preconditioning of Fully Implicit Runge-Kutta Schemes for Parabolic PDEs. *SIAM Journal on Scientific Computing*, vol. 43(5), pp. A3527–A3551, 2021. DOI: 10.1137/20M1387985.
4. Q. Chen and X. Jiao, Robust and Efficient Multilevel-ILU Preconditioned Newton-GMRES for Incompressible Navier-Stokes. *International Journal for Numerical Methods in Fluids*, vol. 93(12), pp. 3405–3423, 2021. DOI: 10.1002/flid.5039.
5. Q. Chen, A. Ghai, X. Jiao, HILUCSI: Simple, Robust, and Fast Multilevel ILU for Large-Scale Saddle-Point Problems from PDEs. *Numerical Linear Algebra with Applications*, vol. 28(6), 2021. DOI: 10.1002/nla.2400.
6. R. Conley, T. J. Delaney, and X. Jiao, A hybrid method and unified analysis of generalized finite differences and Lagrange finite elements. *Journal of Computational and Applied Mathematics*, vol. 376, 2020. DOI: doi.org/10.1016/j.cam.2020.112862.

7. Y. Li, Q. Chen, X. Wang, and X. Jiao, WLS-ENO Remap: Superconvergent and non-oscillatory weighted least squares data transfer on surfaces, *Journal of Computational Physics*, vol. 417, 2020. DOI: doi.org/10.1016/j.jcp.2020.109578.
8. Y. Li, X. Zhao, N. Ray, and X. Jiao, Compact Feature-Aware Hermite-Style High-Order Surface Reconstruction. *Engineering with Computers*, vol. 207, 2019. DOI: 10.1007/s00366-019-00815-z
9. A. Ghai, C. Lu, and X. Jiao, A Comparison of Preconditioned Krylov Subspace Methods for Large-Scale Non-symmetric Linear Systems. *Numerical Linear Algebra with Applications*, vol. 26(1), 2018, DOI: 10.1002/nla.2215.
10. L. Jiang, S. Chen, and X. Jiao, Parametric Shape & Topology Optimization: A New Level Set Approach Based on Cardinal Basis Functions. *International Journal for Numerical Methods in Engineering*, vol. 114, pp. 66-87, 2018. DOI: 10.1002/nme.5733.
11. N. Ray, I. Grindeanu, X. Zhao, V. Mahadevan, and X. Jiao, Array-Based Hierarchical Mesh Generation in Parallel. *Computer Aided Design*, vol. 85, pp. 68–82, 2017, DOI: 10.1016/j.cad.2016.07.011.
12. W. Li, T.J. Delaney, X. Jiao, R. Samulyak, and C. Lu, Finite element model for brittle fracture and fragmentation. *Procedia Computer Science*, vol. 80, pp. 245-256, 2016.
13. H. Liu and X. Jiao, WLS-ENO: Weighted-Least-Squares Based Essentially Non-Oscillatory Schemes for Finite Volume Methods on Unstructured Meshes. *Journal of Computational Physics*, vol. 314, pp. 749–773, 2016. DOI: 10.1016/j.jcp.2016.03.039.
14. X. Wang, R. Samulyak, X. Jiao, and K. Yu, AP-Cloud: Adaptive Particle-in-Cloud Method for Optimal Solutions to Vlasov-Poisson Equation, *Journal of Computational Physics*, vol. 316, pp. 682–699, 2016. DOI: 10.1016/j.jcp.2016.04.037.
15. R. Conley, T.J. Delaney, and X. Jiao, Overcoming Element Quality Dependence of Finite Elements with Adaptive Extended Stencil FEM (AES-FEM), *International Journal for Numerical Methods in Engineering*, vol. 108, pp. 1054–1085, 2016. DOI: 10.1002/nme.5246.
16. V. Dyedov, N. Ray, D. Einstein, X. Jiao, and T.J. Tautges, AHF: Array-Based Half-Facet Data Structure for Mixed-Dimensional and Non-manifold Meshes, *Engineering with Computers*, vol. 31(3), pp. 389-404, 2015. DOI: 10.1007/s00366-014-0378-6.
17. C. Lu, X. Jiao, and N. Missirlis, A hybrid geometric+algebraic multigrid method with semi-iterative smoothers, *Numerical Linear Algebra with Applications*, vol. 21(2), pp. 221–238, 2014. DOI: 10.1002/nla.1925.
18. N. Ray, T. Delaney, D. R Einstein, and X. Jiao, Surface remeshing with robust high-order reconstruction, *Engineering with Computers*, vol. 30(4), pp. 487-502, 2014. DOI: 10.1007/s00366-014-0359-9.
19. D. E. Keyes, L. C. McInnes, C. Woodward, W. Gropp, X. Jiao, et al., Multiphysics Simulations Challenges and Opportunities, *International Journal of High Performance Computing Applications*, vol. 27(1), pp. 4–83, 2013. DOI: 10.1177/1094342012468181.
20. D. Wang, X. Jiao, R. Conley, and J. Glimm, On the Curvature Effect of Thin Membranes, *Journal of Computational Physics*, vol. 233(15), pp. 449–463, 2012. DOI: 10.1016/j.jcp.2012.09.001.
21. N. Ray, D. Wang, X. Jiao, and J. Glimm, High-Order Numerical Integration over Discrete Surfaces, *SIAM Journal on Numerical Analysis*, vol. 50(6), pp. 3061–3083, 2012. DOI:10.1137/110857404.
22. D. R. Einstein, A. P. Kuprat, X. Jiao, J. P. Carson, D. M. Einstein, R. E. Jacob, and R. A. Corley. An Efficient Algorithm for Mapping Imaging Data to 3D Unstructured Grids in Computational Biomechanics, *International Journal for Numerical Methods in Biomedical Engineering*, vol. 28(5), 2012. DOI: 10.1002/cnm.2489.
23. M. B. Neradilek, N. L. Polissar, D. R. Einstein, R. W. Glenney, K. R. Minard, J. P. Carson, X. Jiao, R. E. Jacob, T. C. Cox, E. M. Postlethwait, R. A. Corley, Branch-Based Model for the Diameters of the Pulmonary Airways: Accounting for Departures From Self-Consistency and Registration Errors, *The Anatomical Record*, vol. 295, pp. 1027–1044, 2012. DOI: 10.1002/ar.22476.

24. T. Zhang, R. A. DeSimone, X. Jiao, F. J. Rohlf, W. Zhu, Q. Q. Gong, S. R. Hunt, T. Dassopoulos, R. D. Newberry, E. Sodergren, G. Weinstock, D. N. Frank, E. Li, Host genes related to Paneth cells and xenobiotic metabolism are associated with shifts in human ileum-associated microbial composition, *PLoS ONE*, vol. 7(6), p. e30044. 2012. DOI: 10.1371/journal.pone.0030044.
25. X. Jiao and D. Wang, Reconstructing High-Order Surfaces for Meshing, *Engineering with Computers*, vol. 28, pp. 361-373, 2012. DOI: 10.1007/s00366-011-0244-8.
26. R. Jaiman, P. Geubelle, E. Loth, X. Jiao, Transient fluid–structure interaction with non-matching spatial and temporal discretizations, *Computers & Fluids*, vol. 50, pp. 120–135, 2011.
27. D. R. Einstein, F. Del Pin, X. Jiao, A. P. Kuprat, J. P. Carson, K. S. Kunzelman, R. P. Cochran, J. M. Guccione, M. B. Ratcliffe, Fluid–structure interactions of the mitral valve and left heart: comprehensive strategies, past, present and future, *International Journal for Numerical Methods in Biomedical Engineering*, vol. 26(3-4), pp. 348-380, 2010.
28. T. Kaman, H. Lim, Y. Yu, D. Wang, Y. Hu, J.-D. Kim, Y. Li, L. Wu, J. Glimm, X. Jiao, X.-L. Li, and R. Samulyak, A numerical method for the simulation of turbulent mixing and its basis in mathematical theory, in *Lecture Notes on Numerical Methods for Hyperbolic Equations: Theory and Applications: Short Course Book*, London, pp. 105–129, 2011.
29. X. Li, J. Glimm, X. Jiao, C. Peyser, Y. Zhao, Study of crystal growth and solute precipitation through front tracking method, *Acta Mathematica Scientia*, vol. 30(2B), pp. 377-390, 2010.
30. R. Jaiman, P. Geubelle, X. Jiao, and E. Loth, Combined Interface Boundary Condition Method for Unsteady Fluid-Structure Interaction, *Computer Methods in Applied Mechanics and Engineering*, vol. 200(1-4), pp. 27–39, 2011.
31. J. P. Carson, A. P. Kuprat, D. R. Einstein, X. Jiao, V. Dyedov, F. del Pin, J. M. Guccione, and M. B. Ratcliffe. Adaptive Generation of Multimaterial Grids from imaging data for Biomedical Lagrangian Fluid-Structure Simulations. *Biomechanics and Modeling in Mechanobiology*, vol. 9(2), pp. 187-201, 2010.
32. X. Jiao, D. R. Einstein, and V. Dyedov, Local Orthogonal Cutting Method for Computing Medial Curves and Its Biomedical Applications, *SIAM Journal on Scientific Computing*, vol. 32(2), pp. 947–969, 2010. DOI: 10.1137/090767170.
33. J. P. Pereira, C. A. Duarte, and X. Jiao, Three-dimensional crack growth with hp-generalized finite element and face offsetting methods, *Computational Mechanics*, 2010. DOI: 10.1007/s00466-010-0491-3.
34. X. Jiao, D. Wang, and H. Zha, Simple and Effective Variational Optimization of Surface and Volume Triangulations, *Engineering with Computers*, 27(1):81-94 2010. DOI: 10.1007/s00366-010-0180-z. Also in *Proceedings of 17th International Meshing Roundtable*, pp, 315–332, Pittsburgh, PA, October 2008.
35. D. R. Einstein, F. del Pin, X. Jiao, A. P. Kuprat, J. P. Carson, K. S. Kunzelman, R. P. Cochran, J. M. Guccione and M. B. Ratcliffe. Fluid-Structure Interactions of the Mitral Valve and Left Heart: Comprehensive Strategies, Past, Present and Future. *Communications in Numerical Methods in Engineering*. vol. 26(3), pp. 348-380, 2010. DOI: 10.1002/cnm.1280.
36. T. Wischgoll, D. R. Einstein, A. P. Kuprat, J. P. Carson, X. Jiao, Geometry reconstruction and grid generation, in book *Computational Cardiovascular Mechanics: Modeling and Applications in Heart Failure*. 2010. DOI: 10.1007/978-1-4419-0730-1_7.
37. D. Wang, B. L. Clark and X. Jiao. An Analysis and Comparison of Parameterization-Based Computation of Differential Quantities for Discrete Surfaces, *Computer Aided Geometric Design*. vol. 26(5), pp. 510-527, 2009. DOI: 10.1016/j.cagd.2009.02.006.
38. V. Dyedov, D. R. Einstein, X. Jiao, A. P. Kuprat, J. P. Carson and F. del Pin, Variational Generation of Prismatic Boundary-Layer Meshes for Biomedical Computing, *International Journal for Numerical Methods in Engineering*, vol. 79(8), pp. 907–945, 2009. DOI 10.1002/nme.2583.

39. X. Jiao, D. R. Einstein, V. Dyedov and J. P. Carson, Automatic Identification and Truncation of Boundary Outlets in Complex Imaging-Derived Biomedical Geometries, *Medical & Biological Engineering & Computing*, vol. 47(9), pp. 989–999, 2009. DOI 10.1007/s11517-009-0501-9.
40. J. P. Pereira, C. A. Duarte, X. Jiao and D. Guoy. Generalized Finite Element Method Enrichment Functions for Curved Singularities in 3D Fracture Mechanics Problems. *Computational Mechanics*, vol. 44(1), pp. 73–92, 2009. DOI: DOI: 10.1007/s00466-008-0356-1.
41. J. P. Pereira, C. A. Duarte, D. Guoy, and X. Jiao, Hp-Generalized FEM and crack surface representation for non-planar 3-D cracks, *International Journal for Numerical Methods in Engineering*, vol. 77(5), pp. 601-633, 2009. DOI: 10.1002/nme.2419.
42. X. Jiao, A. Colombi, X. Ni and J. Hart, Anisotropic Mesh Adaptation for Evolving Triangulated Surfaces. *Engineering with Computers*, Vol 26(4): 363-376, 2009. DOI: 10.1007/s00366-009-0170-1. Also in *Proceedings of 15th International Meshing Roundtable*, pp. 173-190, Birmingham, AL, September 2006.
43. X. Jiao and N.R. Bayyana, Identification of C^1 and C^2 Discontinuities for Surface Meshes in CAD, *Computer-Aided Design*, vol 40, pp. 160–174, 2008. DOI: 10.1016/j.cad.2007.10.005.
44. B. Kim, Y. Liu, I. Llamas, X. Jiao, and J. Rossignac, Simulation of Bubbles in Foam with the Volume Control Method, *ACM Transactions on Graphics*, vol. 26(3), 2007. DOI: 10.1145/1276377.1276500.
45. X. Jiao, Face Offsetting: A Unified Framework for Explicit Moving Interfaces. *Journal of Computational Physics*, vol 220(2), pp. 612–625, 2007. DOI: 10.1016/j.jcp.2006.05.021.
46. R. K. Jaiman, X. Jiao, P. H. Geubelle, and E. Loth. Conservative load transfer along curved fluid-solid interface with non-matching meshes. *Journal of Computational Physics*, vol. 218(1), pp. 372-397, 2006.
47. X. Jiao, G. Zheng, P.A. Alexander, M.T. Campbell, O.S. Lawlor, J. Norris, A. Haselbacher and M.T. Heath, A System Integration Framework for Coupled Multiphysics Simulations, *Engineering with Computers*, vol. 22(3-4), pp. 293-309. 2006.
48. R. K. Jaiman, X. Jiao, P. H. Geubelle and E. Loth. Assessment of Conservative Load Transfer for Fluid-Solid Interface with Nonmatching Meshes. *International Journal for Numerical Methods in Engineering*, vol. 64(15), pp. 2014–2038. 2005.
49. X. Jiao and M. T. Heath. Common-Refinement Based Data Transfer Between Nonmatching Meshes in Multiphysics Simulations. *International Journal for Numerical Methods in Engineering*, vol. 61(14), pp. 2402–2427. 2004.
50. X. Jiao and M. T. Heath. Overlaying Surface Meshes, Part I: Algorithms. *International Journal on Computational Geometry and Applications*, vol. 14(6), pp. 379–402. 2004.
51. X. Jiao and M. T. Heath. Overlaying Surface Meshes, Part II: Topology Preservation and Feature Matching. *International Journal on Computational Geometry and Applications*, vol. 14(6), pp. 403–419. 2004.
52. K. Shen, T. Yang and X. Jiao. S^+ : Efficient 2D Sparse LU Factorization on Parallel Machines. *SIAM Journal on Matrix Analysis and Applications*, vol. 22(1), pp. 282–305. 2000.
53. C. Fu, X. Jiao and T. Yang. Efficient Sparse LU Factorization with Partial Pivoting on Distributed Memory Architectures. *IEEE Transaction on Parallel and Distributed Systems*, vol. 9(2), pp. 109–125. 1998.

REFEREED CONFERENCE PAPERS

1. S. Yao, D. Yu, and X. Jiao, Perturbing Eigenvalues with Residual Learning in Graph Convolutional Neural Networks, Asian Conference on Machine Learning, 2021.

2. N. Ray, I. Grindeanu, X. Zhao, V. Mahadevan, and X. Jiao, Array-Based Hierarchical Mesh Generation in Parallel, In *Proceedings of 24th International Meshing Roundtable*, pp. 291-303, Austin, TX, October 2015.
3. X. Zhao, R. Conley, N. Ray, V. S. Mahadevan, and X. Jiao, Conformal and Non-conformal Adaptive Mesh Refinement with Hierarchical Array-based Half-Facet Data Structures, In *Proceedings of 24th International Meshing Roundtable*, Austin, TX, October 2015.
4. V. Dyedov, N. Ray, D. Einstein, X. Jiao, and T. J. Tautges, AHF: Array-Based Half-Facet Data Structure for Mixed-Dimensional and Non-manifold Meshes, In *Proceedings of 22nd International Meshing Roundtable*, pp.445-464, Orlando, FL, October 2013.
5. B. Clark, N. Ray, and X. Jiao, Surface Mesh Optimization, Adaption, and Untangling with High-Order Accuracy, In *Proceedings of 21st International Meshing Roundtable*, San Jose, CA, October 2012.
6. T. Zhang, R. A. DeSimone, H. Chen, C. M. Hamm, J. Yuan, Q. Q. Gong, S. R. Hunt, T. Dassopoulos, R. D. Newberry, D. N. Frank, C. E. Robertson, N. R. Pace, E. Sodergren, G. Weinstock, X. Jiao, W. Zhu, and E. Li. Cluster analysis of genome-wide expression differences in disease-unaffected ileal mucosa in inflammatory bowel diseases. In *Proceedings of the IEEE ICCABS' 11*, pp. 220-225, DOI: 10.1109/ICCABS.2011.5729884, 2011.
7. X. Jiao and D. Wang, Reconstructing High-Order Surfaces for Meshing, In *Proceedings of 18th International Meshing Roundtable*, Chattanooga, TN, October 2010.
8. J. P. Carson, A. P. Kuprat, X. Jiao, and F. del Pin, An anisotropic fluid-solid model of the mouse heart, In *Proceedings of Computers in Cardiology*, pp. 377-380, 2009.
9. X. Jiao and H. Zha, Consistent Computation of First- and Second-Order Differential Quantities for Surface Meshes, In *ACM Solid and Physical Modeling Symposium*, June 2008. DOI: 10.1145/1364901.1364924.
10. A. Jain and X. Jiao, Overlaying Surface Meshes: Extension and Parallelization. In *Proceedings of 16th International Meshing Roundtable*, Seattle, WA, October 2007.
11. D. Guoy, T. Wilmarth, X. Jiao, et al., Parallel Mesh Adaptation for Highly Evolving Geometries with Application to Solid Propellant Rockets, In *Proceedings of 16th International Meshing Roundtable*, Seattle, WA, October 2007.
12. J.-C. Huang, X. Jiao, R. M. Fujimoto, and H. Zha, DAG-Guided Parallel Asynchronous Variational Integrators with Super-Elements, In *Summer Computer Simulation Conference*, San Diego, CA, July 2007.
13. X. Jiao, N.R. Bayyana, and H. Zha, Optimizing Surface Triangulation via Near Isometry with Reference Meshes. In Y. Shi et al. (Eds.) *Computational Science – ICCS 2007, Part I, LNCS 4487*, Beijing, May 2007.
14. X. Jiao, Volume and Feature Preservation in Surface Mesh Optimization. In *Proceedings of 15th International Meshing Roundtable*, Birmingham AL, September 2006.
15. T. J. Alumbaugh and X. Jiao, Compact Array-based Mesh Data Structures. In *Proceedings of 14th International Meshing Roundtable*, San Diego, CA, September 2005.
16. S. Mitra, R. Sinha, M. Winslett, and X. Jiao, An Efficient, Non-intrusive Log-based I/O Mechanism for Scientific Simulations on Clusters, In *IEEE International Conference on Cluster Computing (Cluster 2005)*, Boston, MA, September 2005.
17. X. Jiao and P. J. Alexander, Parallel Feature-Preserving Mesh Smoothing. In *International Conference on Computational Science and Applications*, Singapore, May 2005.
18. M. T. Heath and X. Jiao, Academic Challenges in Coupling Large-Scale Multiphysics Simulations. In *International Conference on Computational Science*, Atlanta, Georgia, May 2005.
19. M. T. Heath and X. Jiao, Parallel Simulation of Multicomponent Systems. Invited paper in *Proceedings of 6th International Conference on High Performance Computing for Computational Science*, Valencia, Spain, June 2004.

20. X. Ma, M. Winslett, J. Norris, X. Jiao, and R. Fiedler, GODIVA: Lightweight Data Management for Scientific Visualization. In *Proceedings of 20th International Conference on Data Engineering (ICDE 2004)*, pp. 732–744, Boston, MA, March 2004.
21. M. T. Heath and X. Jiao, Parallel Computational Methods in Multicomponent Systems. Invited paper in *Proceedings of 11th SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 2004.
22. X. Jiao, M. T. Campbell and M. T. Heath, Roccom: An Object-Oriented, Data-Centric Software Integration Framework for Multiphysics Simulations. In *Proceedings of 17th Annual ACM International Conference on Supercomputing*, pp. 358–368, San Francisco, CA, June 2003.
23. X. Ma, X. Jiao, M. Campbell and M. Winslett, Flexible and Efficient Parallel I/O for Large-Scale Multicomponent Simulations. In *Proceedings of 4th Workshop on Parallel and Distributed Scientific and Engineering Computing with Applications*, Nice, France, April 2003.
24. X. Jiao and M. T. Heath. Feature Detection for Surface Meshes. In *Proceedings of 8th International Conference on Numerical Grid Generation in Computational Field Simulations*, pp. 705–714, Honolulu, HI, June 2002.
25. X. Jiao and M. T. Heath. Efficient and Robust Algorithms for Overlaying Surface Meshes. In *Proceedings of 10th International Meshing Roundtable*, pp. 281–292, Newport Beach, CA, October 2001.
26. X. Jiao, X. Y. Li and X. Ma. SIFFEA: Scalable Integrated Framework for Finite Element Analysis. In *Proceedings of 3rd International Symposium on Computing in Object-Oriented Parallel Environments*, pp. 84–95. San Francisco, CA, December 1999.
27. X. Jiao, H. Edelsbrunner and M. T. Heath. Mesh Association: Formulation and Algorithms. In *Proceedings of 8th International Meshing Roundtable*, pp. 75–82, South Lake Tahoe, CA, October 1999.
28. K. Shen, X. Jiao and T. Yang. Elimination Forest Guided 2D Sparse LU Factorization. In *Proceedings of 10th Annual ACM Symposium on Parallel Algorithms and Architectures (SPAA'98)*, pp. 5-15, Puerto Vallarta, Mexico, June 1998.
29. C. Fu, X. Jiao and T. Yang. A Comparison of 1-D and 2-D Data Mapping for Sparse LU Factorization on Distributed Memory Machines. In *Proceedings of 8th SIAM Conference on Parallel Processing for Scientific Computing*, Minneapolis, MN, March 1997.

TECHNICAL REPORTS and PREPRINTS

1. Q. Chen and X. Jiao. HIFIR: Hybrid Incomplete Factorization with Iterative Refinement for Preconditioning Ill-conditioned and Singular Systems. Preprint arXiv:2106.09877, 2021.
2. C. Lu, T.J. Delaney, and X. Jiao, OPINS: An Orthogonally Projected Implicit Null-Space Method for Singular and Nonsingular Saddle-Point Systems. Preprint arXiv:1511.06845, 2015.
3. Y. Zhou, N. Ray, H. Lim, S. Wang, V. F. de Almeida, J. Glimm, X.-L. Li, and X. Jiao, Development of a front tracking method for two-phase micromixing of incompressible viscous fluids with interfacial tension in solvent extraction, Technical Report ORNL/TM-2012/28, Oak Ridge National Laboratory, 2012.

OTHER CONFERENCE PAPERS AND PRESENTATIONS

1. X. Jiao and Q. Chen, Approximate Generalized Inverses with Iterative Refinement for Preconditioning Singular Systems, SIAM Conference on Applied Linear Algebra (LA21), May 2021, online.

2. Q. Chen and X. Jiao, Robust and Efficient Multilevel-ILU Preconditioning of Newton-GMRES with Applications to Navier-Stokes Equations, 16th Copper Mountain Conference On Iterative Methods, March 2020. University of Colorado, USA (canceled due to COVID-19).
3. Y. Li, Q. Chen, X. Wang, and X. Jiao Overcoming Gibbs Phenomenon in Data Remap and Convection-Dominant PDEs using WLS-ENO Techniques, 16th Copper Mountain Conference On Iterative Methods, March 2020. University of Colorado, USA (canceled due to COVID-19).
4. Y. Li, Q. Chen, X. Wang, and X. Jiao, WLS-ENO Remap: Superconvergent and non-oscillatory weighted least squares data transfer on surfaces. SIAM Conference on Mathematics of Planet Earth (MPE20), June 2020 (rescheduled as virtual conference in Aug. 2020 due to COVID-19).
5. R. Conley, T. J Delaney, X. Jiao, High-Order Adaptive Extended Stencil Finite Element Method (AES-FEM) with Applications in Elasticity Problems, International Congress on Industrial and Applied Mathematics, July 2019, Valencia, Spain.
6. R. Conley, T. J Delaney, X. Jiao, High-Order AES-FEM with High-Order Mesh Reconstruction, *AMS Sectional Meeting*, April 2019, in Hartford, CT.
7. R. Conley, T. J Delaney, X. Jiao, High-Order Imposition of Neumann Boundary Conditions for AES-FEM and GFD. SIAM Annual Meeting, July 2018, Portland, OR.
8. X. Wang, X. Jiao, Q. Chen, and Y. Li, Adaptive Solution Transfer Between Non-matching Meshes for Coupling Climate Models, *13th World Congress on Computational Mechanics*, July 22-27, 2018, New York, NY, USA.
9. A. Ghai and X. Jiao, Multilevel Incomplete LU-Factorization Preconditioner for Predominantly Symmetric Systems, *15th Copper Mountain Conference on Iterative Methods*, March 26-30, 2018, University of Colorado, USA.
10. X. Wang, X. Jiao and Q. Chen, Adaptive Solution Transfer for Nonsmooth Functions Between Nonmatching Meshes, *15th Copper Mountain Conference on Iterative Methods*, March 26-30, 2018, University of Colorado, USA.
11. X. Jiao, Quasicoaxial Simplicial Meshes for Optimal Variational Methods, *27th Annual Fall Workshop on Computational Geometry*, Nov. 2017, Stony Brook, NY.
12. X. Wang, X. Jiao and Q. Chen, Locally Conservative Monotonicity-Preserving Solution Transfer for Multiphysics Simulations, 14th U.S. National Congress on Computational Mechanics, July 17-20, 2017, Montreal, QC, Canada.
13. C. Lu, O. Yang, X. Jiao, and M. Khairoutdinov, A Robust Multigrid Solver for Highly Anisotropic and Singular Elliptic Problems on Spheres, *18th Copper Mountain Conference on Multigrid Methods*, March 26--30, 2017.
14. A. Ghai, C. Lu, and X. Jiao, An Empirical Comparison of Krylov Subspace Methods for Nonsymmetric Linear Systems from PDEs, *14th Copper Mountain Conference on Iterative Methods*, March 20–25, 2016,.
15. R.J. Dholakia, F. Drakopoulos, C. Sadasivan, X. Jiao, D.J. Fiorella, H. H. Woo, B.B. Lieber, N. Chrisochoides, High fidelity image-to-mesh conversion for brain aneurysm/stent geometries, *IEEE International Symposium on Biomedical Imaging: From Nano to Macro*, 2015.
16. H. Liu and X. Jiao, Weighted Least Squares Based Essentially Non-Oscillatory Schemes on Unstructured Meshes, *8th International Congress on Industrial and Applied Mathematics - ICIAM 2015*, Beijing, China, July 2015.
17. T. Delaney, X. Jiao, and R. Conley, Overcoming Element-Quality Dependency with Adaptive Extended-Stencil Finite Element Method, *8th International Congress on Industrial and Applied Mathematics - ICIAM 2015*, Beijing, China, July 2015.

18. X. Jiao, N. Ray, C. Lu and X. Zhao, High-Order Surface Reconstruction with Applications in Parallel Meshing and Finite Element Solvers, *SIAM Conference on Computational Science and Engineering*, Salt Lake City, March 2015.
19. N. Ray, X. Zhao, V. Mahadevan, X. Jiao, Efficient Unstructured Mesh Traversal Methods Based on Array-Based Half Facets, *SIAM Conference on Computational Science and Engineering*, Salt Lake City, March 2015.
20. C. Lu, X. Zhao, N. Ray, X. Jiao, Generation of Hierarchical Tetrahedral Meshes with High-Order Projections for Efficient Multigrid Solvers, *23rd International Meshing Roundtable*, London, UK, October 2014.
21. X. Jiao and C. Lu, A Multigrid Generalized Finite Difference (GFD) Method, *16th Copper Mountain Conference on Multigrid Methods*, March 2013.
22. C. Lu, X. Jiao, and X. Wei, HyGA: A Hybrid Geometric+Algebraic Multigrid Solver for Weighted-Residual Methods with Hierarchical Meshes, *16th Copper Mountain Conference on Multigrid Methods*, March 2013.
23. N. Ray, D. Wang, X. Jiao, and J. Glimm, High-order Computation of Surface Integrals over Discrete Surfaces, *7th International Congress on Industrial and Applied Mathematics - ICIAM 2011*, Vancouver, BC, Canada, July 2011.
24. X. Jiao, D. R. Einstein, A. P. Kuprat, V. Dyedov, and N. Ray, Variational Generation of Hybrid Prism-Tetrahedral Meshes for Biomedical Applications, *2nd International Conference on Computational and Mathematical Biomedical Engineering (CMBE11)*, Washington DC, March 2011.
25. V. Dyedov, D. R. Einstein and X. Jiao, Robust Medial Curve Computation for Biomedical Geometries, *2nd International Conference on Computational and Mathematical Biomedical Engineering (CMBE11)*, Washington DC, March 2011.
26. X. Jiao, D. R. Einstein, V. Dyedov, A. Kuprat, N. Ray, Generation and Optimization of Prismatic-tetrahedral Hybrid Meshes for Complex Biomedical Geometries, *SIAM Conference on Computational Science and Engineering*, Reno NV, February 2011.
27. Y. Chen, X. Jiao, W. Lin, M. Zhang and J. He, Conservative and Noise Resistant Data Remapping for Coupled Regional Climate Modeling, *SIAM Conference on Computational Science and Engineering*, Reno NV, February 2011.
28. X. Jiao, V. Dyedov, and D. R. Einstein, Local Orthogonal Cutting Method for Computing Medial Curves and Its Applications, in *16th US National Congress of Theoretical and Applied Mechanics*, State College, PA, July 2010.
29. D. R. Einstein, J. Carson, X. Jiao, and A. Kuprat, Challenges in Geometric Analysis and Processing of Biomedical Geometries, in *SIAM/ACM Joint Conference on Geometric Design and Solid & Physical Modeling*, San Francisco, CA, October 2009.
30. X. Jiao, V. Dyedov, and D. R. Einstein, Geometric Processing and Mesh Generation for Imaging-Derived Biomedical Data, in *SIAM/ACM Joint Conference on Geometric Design and Solid & Physical Modeling*, San Francisco, CA, October 2009.
31. V. Dyedov, D. Einstein, X. Jiao, A. Kuprat, and D. Wang, Variational Generation of Prismatic Boundary-Layer Meshes for Biomedical Computation, in *7th Symposium on Trends in Unstructured Mesh Generation*, Columbus, OH, July 2009.
32. R.S. Bellur Ramaswamy, E. Fried, X. Jiao, and D.A. Tortorelli, Simulating Solid-Solid Phase Transition in Shape-Memory Alloy Microstructure by Face-Offsetting Method, in *Multiscale and Functionally Graded Materials Conference*, Honolulu, Hawaii, October 2006.
33. X. Jiao. Face Offsetting Method for Entropy-Satisfying Lagrangian Interface Propagation. In *7th World Congress on Computational Mechanics*, Los Angeles, CA, July 2006.

34. C. Duarte, J. Pereira, X. Jiao, A Robust Geometry Engine for Modeling 3-D Crack Problems with the Generalized Finite-Element Method, presented at *7th World Congress on Computational Mechanics*, Los Angeles, CA, July 2006.
35. R. Jaiman, P. Geubelle, X. Jiao, E. Loth, Accuracy and stability of loosely-coupled procedure for fluid-structure interaction, presented at *7th World Congress on Computational Mechanics*, Los Angeles, CA, July 2006.
36. X. Jiao, G. Zheng, and M. T. Heath. System Integration Framework for Dynamic, Large-Scale Multiphysics Simulations. In *8th U.S. National Congress on Computational Mechanics*, Austin, TX, July 2005.
37. R. K. Jaiman, X. Jiao, P. H. Geubelle and E. Loth. Assessment of Conservative Load Transfer for Fluid-Solid Interface with Nonmatching Meshes. In *8th U.S. National Congress on Computational Mechanics*, Austin, TX, July 2005.
38. X. Jiao, A Flexible Software Framework for Coupling Large-Scale Multicomponent Systems. In *SIAM Annual Meeting*, New Orleans, LA, July 2005.
39. X. Jiao, O. S. Lawlor, J. C. Norris, P. J. Alexander, G. Zheng, M. T. Campbell, M. T. Heath and R. A. Fiedler, Advanced Technologies for System Integration of Dynamic, Large-Scale Multiphysics Simulations. In *Proceedings of 41st AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, Tucson, AZ, July 2005.
40. X. Jiao, Parallel Data Transfer between Nonmatching Moving Interfaces. Presented at *11th SIAM Conference on Parallel Processing for Scientific Computing*, San Francisco, CA, February 2004.
41. X. Jiao and M. T. Heath, Accurate, Conservative Data Transfer between Nonmatching Meshes in Multiphysics Simulations. Presented at *7th US National Congress on Computational Mechanics*, Albuquerque NM, July 2003.
42. X. Jiao and M. T. Heath, Common Refinement of Nonmatching Meshes for Accurate and Conservative Data Transfer. Presented at *SIAM Conference on Computational Science and Engineering*, San Diego, CA, February 2003.
43. R. Fiedler, M. Breitenfeld, X. Jiao, A. Haselbacher, P. Geubelle and D. Guoy, Simulations of Slumping Propellant and Flexing Inhibitors in Solid Rocket Motors. In *Proceedings of 38th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, Indianapolis, IN. July 2002.
44. R. Fiedler, X. Jiao, A. Namazifard, A. Haselbacher, F. Najjar and I. D. Parsons, Coupled Fluid-Structure 3-D Solid Rocket Motor Simulations. In *Proceedings of 37th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, Salt Lake City, UT. July 2001.
45. I. D. Parsons, P. Alavilli, A. Acharya, R. Fiedler, X. Jiao and A. Namazifard, Coupled Simulations of Solid Rocket Motors. In *Proceedings of 36th AIAA/ASME/SAE/ASEE Joint Propulsion Conference & Exhibit*, Huntsville, Alabama, July 2000.
46. I. D. Parsons, P. Alavilli, A. Namazifard, X. Jiao and A. Acharya, Fluid-Structure Interaction through a Non-Material Interface: Simulations of Solid Rocket Motors. Presented at *ASCE 14th Engineering Mechanics Conference (EM 2000)*, Austin, TX, May 2000.

INVITED LECTURES

1. Superconvergent and Non-oscillatory Discretization Methods for Fluid Dynamics, Department of Mathematics at Purdue University. April, 2020.
2. Hierarchical Unstructured Meshes for Accurate and Efficient Numerical PDE Solvers, Fifth Workshop on Grid Generation for Numerical Computations, University of Liege, July 2016.
3. Robust Adaptive High-Order Geometric and Numerical Methods Based on Weighted Least Squares, National Institute of Aerospace, March 2016.

4. Essentially Non-Oscillatory Schemes over Unstructured Meshes Based on Weighted Least Squares, Argonne National Laboratory, October 2014.
5. Unified Discretizations and Solution Techniques for Numerical Computations over Complex Geometries, Old Dominion University, January. 2013
6. Unified Discretizations and Solution Techniques for PDEs over Complex Geometries, Argonne National Laboratory, February 2013
7. High-Order and Robust Numerical Computations over Complex Geometries, Sandia National Laboratories, October 2012.
8. High-Order Numerical Methods over Discrete Surfaces, Wichita State University, March 2012.
9. Some Mathematical Issues at Interfaces in Multiphysics Coupling, *DOE Multiphysics Workshop*, Park City, UT, July 2011.
10. Short Course on Differential Geometry and Matrix Methods in Geometric Analysis and Meshing, International Meshing Roundtable, Chattanooga TN, October 2010.
11. Interface Tracking Using Face Offsetting, Anisotropic Adaptation, and Beyond, University of Illinois, October 2009.
12. Common refinement and conservative data transfer, Idaho National Lab., July 2009.
13. Interface Tracking Using Face Offsetting and Anisotropic Adaptation, Los Alamos National Lab., April 2009.
14. Dynamic Interfaces in Parallel Numerical Simulations, Penn State University, March 2007.
15. A Unified Framework for Explicit Moving Interfaces, Oak Ridge National Laboratory, March 2006.
16. A Unified Framework for Explicit Moving Interfaces, University of Alabama at Birmingham, February 2006.
17. Face-Offsetting Method for Dynamic Moving Interfaces, Stony Brook University, May 2005.
18. Dynamic Interfaces in Multicomponent Simulations, Mississippi State University, April 2005.

OPEN-SOURCE SOFTWARE PRODUCTS

- Q. Chen and X. Jiao, HIFIR: Hybrid Incomplete Factorization with Iterative Refinement for Preconditioning Ill-conditioned and Singular Systems. <https://github.com/hifirworks/hifir>.
- Y. Li and X. Jiao, ARPIST: Anchored Radially Projected Integration for Spherical Triangles. <https://github.com/numgeom/ARPIST>.
- X. Jiao, Q. Chen, R. Conley, J. Jones, Y. Li, N. Chaturvedi, and X. Wang, NumGeom C++ Suite (<https://github.com/numgeom/>) for Spectral and Finite Element Methods (sfelib-cpp), Weighted-Least-Squares Generalized Finite Difference Methods (wslib-cpp), Adaptive-Extended-Stencil Enhanced Methods (aesem-cpp), Array-based High-Order Meshing Library (ahmesh-cpp), Robust Discontinuity Indicators (rdilib-cpp), and Optimally Preconditioned Fully Implicit Runge-Kutta Schemes (opfirk-cpp). (Under development)
- X. Jiao, CGNS4M: CFD General Notation System for MATLAB and Octave. <https://github.com/numgeom/cgns4m>.

OTHER PROFESSIONAL ACTIVITIES

- Chair,** Minisymposium on Preconditioning and Solution Techniques for Indefinite Systems and Eigenvalue Problems, 05/2021.
Coordinated sessions in *SIAM Conference on Applied Linear Algebra (LA21)*, online
- Chair,** 21st International Meshing Roundtable, San Jose, CA 10/2012.
- Chair,** Minisymposium on Geometric Processing and Mesh Generation in Biomedical Engineering 10/2009
in *SIAM/ACM Joint Conference on Geometric Design and Solid & Physical Modeling*
- Co-chair,** Minisymposium on Interfaces in Parallel Multiphysics Simulations 02/2004
Coordinated session in *11th SIAM Conference on Parallel Processing for Scientific Computing*
- External committee member,**
SIAM Conference on Computational Science and Engineering (CSE 11), 2011
Geometric Modeling and Processing, 2014–2017
Committee member of 20th International Meshing Roundtable, 2011
Member of Steering Committee of CGNS, the CFD data standard, 12/2008–06/2015
- Editorial Boards,**
Engineering with Computers, MDPI Mathematics
- Referees,** SIAM Journal on Scientific Computing, Applied Mathematics Letters, International Journal for Numerical Methods in Engineering, Journal of Computational Physics, Journal of Computational and Applied Mathematics, Computer Methods in Applied Mechanics and Engineering, Computers and Mathematics with Applications, ACM Transactions on Mathematical Software, IEEE Transaction on Parallel and Distributed Systems, IEEE Transaction on Visualization and Computer Graphics, SIGGRAPH Asia, Engineering with Computers, BIT Numerical Mathematics, Modeling and Simulations, Computer Aided Design, Computer Aided Geometric Design, Computers and Fluids, Computers & Mathematics with Applications, Mathematical Methods in the Applied Sciences, International Journal of Modelling and Simulation, AIAA Journal of Propulsion and Power, International Meshing Roundtable, DOE SBIR-STTR Grant Proposals, Czech Science Foundation

STUDENTS AND POSTDOC

Current Ph.D. Students:

Nilesh Chaturvedi,
Hongji Gao,
Jacob Jones,
Xuebin Wang

Current Postdoctoral Associate:

Qiao Chen

Past Students Advised and Co-Advised:

Qiao Chen (Ph.D., Stony Brook 2021),
Yipeng Li (Ph.D., Stony Brook 2021, now at OneFlow),
Aditi Ghai (Ph.D., Stony Brook 2019, now at Cadence),
Tristan Delaney (Ph.D., Stony Brook 2017, now with Synopsis)
Hongxu Liu (Ph.D., Stony Brook, 2016, now at OfferUp)
Xinglin Zhao (Ph.D., Stony Brook, 2016, now with Databricks)
Rebecca Conley (Ph.D., Stony Brook, 2016, now with Saint Peter's University)
Cao Lu (Ph.D., Stony Brook, 2016, now with Microsoft)
Navamita Ray (Ph.D., Stony Brook, 2014, now at Los Alamos National Laboratory)
Ying Chen (Ph.D., Stony Brook, 2012)
Bryan Clark (Ph.D., Stony Brook, 2012)

Volodymyr Dyedov (Ph.D., Stony Brook, 2012)
Duo Wang (Ph.D., Stony Brook, 2012, now at Netflix),
R. K. Jaiman (Ph.D., UIUC, co-advised with Profs. P. Geubelle and E. Loth)
Phil J. Alexander (M.S., UIUC, now at Volition Inc.)
Tyler J. Alumbaugh (M.S., UIUC, now at Lawrence Livermore National Laboratory)
Rao Bayyana (M.S., Georgia Tech)
Ankita Jain (M.S., UIUC, now at Cisco Systems, Inc.)
Gopal Pai (M.S., Georgia Tech, with Prof. H. Park, now at Microsoft)