

CURRICULUM VITAE

Shan Zhao

Contact Information

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Education

- Ph.D., Scientific Computing, National University of Singapore, (July, 2003).
Dissertation: *Aspects of Discrete Singular Convolution for Scientific and Engineering Computing.*
- B.Sc., Mathematics, Lanzhou University, P.R. China (July, 1997).

Academic Positions

- **Professor**, Department of Mathematics, University of Alabama. (8/2015–).
- **Associate Professor**, Department of Mathematics, University of Alabama. (8/2011–8/2015).
- **Visiting Associate Professor**, Beijing Computational Science Research Center, China, (8/2013–3/2014).
- **Assistant Professor**, Department of Mathematics, University of Alabama. (8/2006–8/2011).
- **Assistant Professor**, (Non-Tenure-Track), Department of Mathematics, Michigan State University. (1/2004–8/2006).
- **Visiting Research Instructor**, Department of Mathematics, Michigan State University. (8/2003–1/2004).
- **Research Assistant**, Department of Computational Science, National University of Singapore. (8/2002–8/2003).

Research Experience and Interests

- **Scientific computing:** Computational electromagnetics and optics; Computational biology; Biomolecular simulations; Electrostatic analysis; Heat transfer; Short wave problems; Material interface problems.
- **Mathematical biology:** Mathematical modeling for molecular biology; Implicit solvent modeling of proteins; Biomolecular solvation analysis; Molecular surface modeling.
- **Numerical Methods for Partial differential equations:** Finite difference methods; Finite element methods; Discontinuous Galerkin methods; Spectral methods; Wavelet Collocation methods; Alternating direction implicit methods; Time stepping schemes; Operator splitting methods; Immersed interface methods; Matched interface and boundary methods.
- **Other interdisciplinary interests:** Nonlinear dynamics; Digital signal processing; Financial mathematics.

Research Grants

- **NSF ICERM Topical Workshop program:** “Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials”, PI: Vrushali Bokil, Co-PIs: Y. Cheng, S. Hagness, F. Li, F. Teixeira, S. Zhao. \$25,000, 2018.
- **Simons Foundation Collaboration Grants for Mathematicians program:** Award ID: 524151, “High order operator splitting methods for biomolecular simulations ”, PI: Shan Zhao, \$42,000, 09/01/2017 - 08/31/2022.
- **UA Research Stimulation Program (RSP) Award:** “Locally-one-dimensional (LOD) finite difference simulations for complex material interfaces: algorithm and applications”, Single PI, \$87,754; 2014 - 2016.
- **NSF DMS Computational Mathematics Program:** DMS-1318898, “Matched alternating direction implicit (ADI) schemes for solving the nonlinear Poisson-Boltzmann equation with complex dielectric interfaces”, PI: Shan Zhao; Co-PI: Weihua Geng. \$250,000, 08/15/2013 - 08/14/2017.
- **NSF DMS Computational Mathematics Program:** DMS-1016579, “Modeling, algorithms and computation of electromagnetic wave interacting with dispersive interface”, Single PI, \$150,000, 08/15/2010 - 08/01/2014.
- **UA Research Grants Committee (RGC) Award:** “Development of a unified framework for time stepping”, Single PI, \$5,000, 05/15/2010 - 05/14/2012.
- **NSF DMS Computational Mathematics Program:** DMS-0609844, “Fast simulation of wave scattering and propagation in inhomogeneous media with complex geometries”, Single PI, \$73,074, 09/01/2006 - 08/31/2010.
- **NSF DMS Mathematical Biology Program:** DMS-0616704, “Mathematical modeling of biomolecular surfaces”, PI: G.W. Wei; Co-PIs: P. Bates, and S. Zhao, \$303,310, 08/01/2006 - 07/31/2009.

Honors, Awards and Scholarships

- **Outstanding Reviewer**, Journal of Computational Physics, Elsevier, 2015.
- **Invited Speaker**, 14 conferences.
- **Research Scholarship**, 1999 - 2002, National University of Singapore.
- **Undergraduate Scholarship**, 1993 - 1997, Lanzhou University, China.
- **Success Prize**, Mathematical Modeling Contest, 1996, Gansu Province, China.

Editorial Boards

- **Journal Editor:** Computational and Mathematical Biophysics, (2018 -)
- **Editor:** Computation, (2017 -)
- **Journal Editor:** Molecular Based Mathematical Biology, (2014 - 2017)
- **Associate Editor:** Molecular Based Mathematical Biology, (2012 - 2013)
- **Editor:** Journal of Applied Mathematics, (2011 - 2016)
- **Guest Editor:** International Journal of Biomedical Imaging, 2010 and 2011.
- **Guest Editor:** The Scientific World Journal, 2014.

Professional Activities

- **Funding Proposal Panelist and Reviewer:**
NASA EPSCoR Program, NSF Program of Geophysics, NSF Program of focused research groups in the mathematical science, NSF Program of Mathematical Biology, NSF Program of Computational Mathematics.

- **External Reviewer for Tenure and Promotion:**
 Department of Mathematics and Statistics, University of Calgary, Canada, (2017).
 Department of Mathematics and Statistics, University of North Carolina at Charlotte (2016).
 Department of Mathematics, Mississippi State University (2014).
- **Conference Organizer:**
 SIAM Conference on the Life Sciences, Minneapolis, August 6 - 9, 2018.
 ICREM Workshop on Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, Brown University, June 25 - 29, 2018.
 29th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Nov. 5, 2016.
- **Minisymposium Organizer:** 9 conferences.
- **International Advisory Committee**
 International Conference on Mathematical Modeling and Scientific Computing (ICMMSC-2018), July 18-20, 2018, IIT Indore, Indore, India.
- **Reviewer:** 51 Journals and one conference,
- **University Committee Service:**
 UA-UAB-UAH Joint Applied Mathematics PhD Program Committee, Chair (2016 - 2017) and Permanent member (2014 -).
 Founding Faculty Adviser, Badminton Club of the University of Alabama, (2011 -).
 UA Research Grants Committee, (2014 - 2017).
 Undergraduate Research Judge, Undergraduate Research/Creative Activity Poser and Oral Presentation Competitions, April 9, 2007.
- **College Committee Service:**
 Academy for Undergraduate Research of the College of Arts and Sciences, (Aug. 2014 -)
 Diversity Committee of the College of Arts and Sciences, (Aug. 2014 - Aug. 2017)
- **Departmental Committee Service:**
 Departmental Long Range Planning Committee, 2017 -
 Departmental Colloquium committee, 2015 -
 Graduate Admission and Scholarship Committee, 2015 -
 Department Tenure, Promotion, and Retention Committee 2012 -
 Calculus II Course Coordinator, Fall 2017.
 Department Hiring Committee (Chair), 2016 - 2017
 Applied Math Seminar Coordinator, 2014 - 2017
 Applied Math Tracks committee, 2016.
 Ainsworth Endowed Scholarships Committee, 2014 - 2015.
 Math Department Chair Searching Committee, 2014 - 2015
 Math Servers Upgrade Committee (Chair), 2014.
 Department Hiring Committee, 2012 - 2013.
 Department Graduate Course Committee, Fall, 2012
 Department Hiring Committee, 2011 - 2012.
 Department Hiring Committee, 2010 - 2011.
 Department Hiring Committee, 2009 - 2010.
 Committee for Calculus I Pilot Program, Spring, 2009.

Advising and Supervision

- **Host of long term visitors:**
 - Prof. Lunji Song, School of Mathematics and Statistics, Lanzhou University, China. (July 2014 – Aug. 2015).
 - Prof. Guangqing Long, School of Mathematics Sciences, Guangxi Teachers Education University, China. (Dec. 2012 – June 2013).
- **Postdoctoral Advisor**
 - Dr. Lunji Song, Department of Mathematics, University of Alabama, Aug. 2015 - Aug. 2016
 - Dr. Chuan Li, Department of Mathematics, University of Alabama, Aug. 2014 - Aug. 2015
 - Dr. Can Li, Beijing Computational Science Research Center, China. Jan. 2014 - March 2015.
- **Undergraduate Research Mentor**
 - Benjamin Jones, Major in Mathematics, University of Alabama, Aug. 2017 –
 - Qiangang Fu, Major in Mathematics, University of Alabama, Jan. 2017 – May 2017
 - Joseph Gallagher, Major in Mathematics, University of Alabama, Oct. 2015 – May 2017
 - Andrew W. Davis, Major in Mathematics, University of Alabama, Oct. 2015 – Sept. 2016
 - Leighton Wilson, Major in Mathematics, University of Alabama, August 2012 – May 2015
 - Christ Gutturomsson, Major in Mathematics, University of Alabama, 2014 - 2015
 - Robin Wu, double major in Chemical Engineering and Mathematics, University of Alabama, 2010
- **PhD Committee Chair:**
 - Arum Lee, Department of Mathematics, University of Alabama, 2017 –
 - Hongsong Feng, Department of Mathematics, University of Alabama, 2016 –
 - Siwen Wang, Department of Mathematics, University of Alabama, 2015 –
 - Sheik A. Ullah, Department of Mathematics, University of Alabama, 2015 –
 - Tania Hazra, Department of Mathematics, University of Alabama, 2014 –
 - Zhihan Wei, Department of Mathematics, University of Alabama, 2013 –
 - Duc Nguyen, Department of Mathematics, University of Alabama, Graduated August 2015.
 - Wufeng Tian, Department of Mathematics, University of Alabama, Graduated August 2014.
 - Pengfei Yao, Department of Mathematics, University of Alabama, Graduated August 2011.
- **MSc Committee Chair:**
 - Leighton Wilson, Department of Mathematics, University of Alabama, Graduated May 2015.
 - Guoqiao Wang, Department of Mathematics, University of Alabama, Graduated May 2010.
- **PhD Committee Member:**
 - 26 students.
- **MSc Committee Member:**
 - 14 student.

Teaching

- **University of Alabama**
 - Spring 2018, Math 301, Discrete Mathematics, 30 students

Spring 2018, Math 410/510-002 Numerical Linear Algebra, 21+9 students
Spring 2018, Math 698 Non-Dissertation Research, 3 student
Spring 2018, Math 699 Dissertation Research, 3 students
Fall 2017, Math 126-001 Calculus II, 185 students
Fall 2017, Math 126-002 Calculus II, 185 students
Fall 2017, Math 698 Non-Dissertation Research, 2 student
Fall 2017, Math 699 Dissertation Research, 3 students
Spring 2017, Math 300-001 Introduction to Numerical Analysis, 50 students
Spring 2017, Math 512-001 Numerical Analysis II, 11 students
Spring 2017, Math 499 Undergraduate Research Experience, 1 student
Spring 2017, Math 698 Non-Dissertation Research, 1 student
Spring 2017, Math 699 Dissertation Research, 2 students
Fall 2016, Math 125-002 Calculus I, 96 students
Fall 2016, Math 125-003 Calculus I, 116 students
Fall 2016, Math 499 Undergraduate Research Experience, 1 student
Fall 2016, Math 698 Non-Dissertation Research, 1 student
Fall 2016, Math 699 Dissertation Research, 2 students
Spring 2016, Math 237-002, Introduction to Linear Algebra, 55 students
Spring 2016, Math 410/510-001 Numerical Linear Algebra, 34+10 students
Spring 2016, Math 499 Undergraduate Research Experience, 2 students
Spring 2016, Math 699 Dissertation Research, 2 students
Fall 2015, Math 125-002 Calculus I, 72 students
Fall 2015, Math 125-003 Calculus I, 72 students
Fall 2015, Math 698-003 Non-Dissertation Research, 2 students
Spring 2015, Math 125-005 Calculus I, 68 students
Spring 2015, Math 512-002 Numerical Analysis, 15 students
Spring 2015, Math 599 Thesis Research, 1 student
Spring 2015, Math 699 Dissertation Research, 1 student
Fall 2014, Math 237-005 Introduction to Linear Algebra, 40 students
Fall 2014, Math 237-006 Introduction to Linear Algebra, 37 students
Fall 2014, Math 599 Thesis Research, 1 student
Fall 2014, Math 699 Dissertation Research, 1 student
Spring 2014, Math 699 Dissertation Research, 2 students
Fall 2013, Math 699 Dissertation Research, 2 students
Spring 2013, Math 512 Numerical Analysis II, 11 students
Spring 2013, Math 699 Dissertation Research, 2 students
Fall 2012, Math 125 Calculus I, 88 students
Fall 2012, Math 300 Introduction to Numerical Analysis, 33 students
Fall 2012, Math 698 Non-Dissertation Research, 2 students
Fall 2012, Math 699 Dissertation Research, 1 students
Spring 2012, Math 512 Numerical Analysis II, 4 students
Spring 2012, Math 410 Numerical Linear Algebra, 25 students
Spring 2012, Math 698 Non-Dissertation Research, 2 students
Spring 2012, Math 699 Dissertation Research, 2 students
Fall 2011, Math 247 Honors Calculus III, 38 students
Fall 2011, Math 238 Applied Differential Equations, 33 students

Fall 2011, Math 699 Dissertation Research, 1 student
 Spring 2011, Math 512 Numerical Analysis II, 10 students
 Spring 2011, Math 237 Introduction to Linear Algebra, 31 students
 Spring 2011, Math 699 Dissertation Research, 2 students
 Fall 2010, Math 411/511 Numerical Analysis I, 14+16 students
 Fall 2010, Math 126 Calculus II, 43 students
 Fall 2010, Math 699 Dissertation Research, 2 students
 Spring 2010, Math 125 Calculus I, 66 students
 Spring 2010, Math 300 Introduction to Numerical Analysis, 27 students
 Spring 2010, Math 699 Dissertation Research, 2 students
 Fall 2009, Math 237 Applied Matrix Theory, 33 students
 Fall 2009, Math 238 Applied Differential Equations, 28 students
 Fall 2009, Math 699 Dissertation Research, 2 students
 Spring 2009, Math 125 Calculus I, 38 students
 Spring 2009, Math 238 Applied Differential Equations, 28 students
 Spring 2009, Math 699 Dissertation Research, 2 students
 Fall 2008, Math 125 Calculus I, 29 students
 Fall 2008, Math 238 Applied Differential Equations, 23 students
 Spring 2008, Math 126 Calculus II, 28 students,
 Spring 2008, Math 300 Introduction to Numerical Analysis, 29 students
 Fall 2007, Math 125 Calculus I, 20 students
 Fall 2007, Math 238 Applied Differential Equations, 28 students
 Spring 2007, Math 300 Introduction to Numerical Analysis, 22 students
 Spring 2007, Math 410/510 Numerical Linear Algebra, 13+7 students
 Fall 2006, Math 125 Calculus I, 27 students

- **Michigan State University**

MTH 132, Calculus I, Fall 2003, Fall 2004, and Fall 2005.

MTH 235, Differential Equations, Spring 2004, Spring 2005, and Spring 2006.

- **National University of Singapore**

Teaching Assistant: Numerical Methods I, 2000; Scientific Problem Solving and Computation, 2000, 2001; Symbolic Computation, 2001; Computational Techniques for Quantum Systems, 2002;

Mentor: Two honors projects; Four undergraduate research projects.

Journal Publications

- [1] G.W. Wei, and S. Zhao, Synchronization and information processing by an on-off coupling. *Physical Review E*, **65**, 056210, (2002).
- [2] S. Zhao and G.W. Wei, Comparison of the discrete singular convolution and three other numerical schemes for solving Fisher's equation. *SIAM Journal on Scientific Computing*, **25**, 127-147, (2003).
- [3] Z.H. Shao, G.W. Wei, and S. Zhao, DSC time-domain solution of Maxwell's equations. *Journal of Computational Physics*, **189**, 427-453, (2003).
- [4] S. Zhao and G.W. Wei, Jump process for the trend estimation of time series. *Computational Statistics and Data Analysis*, **42**, 219-241, (2003).

- [5] G. Bao, G.W. Wei, and S. Zhao, Local spectral time-domain method for electromagnetic wave propagation. *Optics Letters*, **28**, 513-515, (2003).
- [6] G. Bao, G.W. Wei, and S. Zhao, Numerical solution of the Helmholtz equation with high wavenumbers. *International Journal for Numerical Methods in Engineering*, **59**, 389-408, (2004).
- [7] S. Zhao and G.W. Wei, Tensor product derivative matching for wave propagation in inhomogeneous media. *Microwave and Optical Technology Letters*, **43**, 69-77, (2004).
- [8] S. Zhao and G.W. Wei, High-order FDTD methods via derivative matching for Maxwell's equations with material interfaces. *Journal of Computational Physics*, **200**, 60-103, (2004).
- [9] S. Zhao, G.W. Wei and X. Yang, DSC analysis of free-edged beams by an iteratively matched boundary method. *Journal of Sound and Vibration*, **284**, 487-493, (2005).
- [10] S.N. Yu, S. Zhao, and G.W. Wei, Local spectral time-splitting method for first and second order partial differential equations. *Journal of Computational Physics*, **206**, 727-780, (2005).
- [11] S. Zhao and G.W. Wei, Option valuation by using discrete singular convolution. *Applied Mathematics and Computation*, **167**, 383-418, (2005).
- [12] Y.C. Zhou, S. Zhao, M. Feig, and G.W. Wei, High order matched interface and boundary method for elliptic equations with discontinuous coefficients and singular sources, *Journal of Computational Physics*, **213**, 1-30, (2006).
- [13] Ge Wang, Haiou Shen, Wenxiang Cong, Shan Zhao, and G.W. Wei, Temperature modulated bioluminescence tomography, *Optics Express*, **14(17)**, 7852-7871, (2006).
- [14] G.W. Wei and S. Zhao, On the validity of "A proof that the discrete singular convolution (DSC)/Lagrange-distributed approximation function (LDAF) method is inferior to high order finite differences", *Journal of Computational Physics*, **226**, 2389-2392, (2007).
- [15] S. Zhao, On the spurious solutions in the high-order finite difference methods, *Computer Methods in Applied Mechanics and Engineering*, **196**, 5031-5046, (2007).
- [16] P. Bates, G.W. Wei, and S. Zhao, Minimal molecular surfaces and their applications, *Journal of Computational Chemistry*, **29**, 380-391, (2008).
- [17] S. Zhao, Full-vectorial matched interface and boundary (MIB) method for the modal analysis of dielectric waveguides, *IEEE/OSA Journal of Lightwave Technology*, **26**, 2251-2259, (2008).
- [18] S. Zhao and G.W. Wei, Matched interface and boundary (MIB) for the implementation of boundary conditions in high-order central finite differences, *International Journal for Numerical Methods in Engineering*, **77**, 1690-1730, (2009).
- [19] S. Rosencrans, X. Wang, W. Winter, and S. Zhao, Measuring the insulating ability of anisotropic thermal conductors via principal Dirichlet eigenvalue, *European Journal of Applied Mathematics*, **20**, 231-246, (2009).

- [20] S. Zhao, High order vectorial analysis of waveguides with curved dielectric interfaces, *IEEE Microwave and Wireless Components Letters*, **19**, 266-268, (2009).
- [21] P. Bates, Z. Chen, Y. Sun, G.W. Wei, and S. Zhao, Geometric and potential driving formation and evolution of biomolecular surfaces, *Journal of Mathematical Biology*, **59**, 193-231, (2009).
- [22] S. Zhao, High order matched interface and boundary methods for the Helmholtz equation in media with arbitrarily curved interfaces, *Journal of Computational Physics*, **229**, 3155-3170, (2010).
- [23] S. Zhao, A fourth order finite difference method for waveguides with curved perfectly conducting boundaries, *Computer Methods in Applied Mechanics and Engineering*, **199**, 2655-2662, (2010).
- [24] G.W. Wei, Lalita Udpa, Yang Wang, and S. Zhao, Editorial: Mathematical Methods for Images and Surfaces, *International Journal of Biomedical Imaging*, **2010**, 918467, (2010).
- [25] S. Zhao, High order FDTD methods for transverse electromagnetic systems in dispersive inhomogeneous media, *Optics Letters*, **36**, 3245-3247, (2011).
- [26] Pengfei Yao and S. Zhao, A new boundary closure scheme for the multiresolution time-domain (MRTD) method, *IEEE Transaction on Antennas and Propagation*, **59**, 3305-3312, (2011).
- [27] S. Zhao, Pseudo-time coupled nonlinear models for biomolecular surface representation and solvation analysis, *International Journal for Numerical Methods in Biomedical Engineering*, **27**, 1965-1981, (2011).
- [28] Weihong Guo, Lalita Udpa, Yang Wang, G.W. Wei, and S. Zhao, Editorial: Mathematical Methods for Images and Surfaces 2011, *International Journal of Biomedical Imaging*, **2012**, 419647, (2012).
- [29] Zhan Chen, S. Zhao, Jaehun Chun, Dennis G. Thomas, Nathan A. Baker, Peter W. Bates, and G.W. Wei, Variational approach for nonpolar solvation analysis, *Journal of Chemical Physics*, **137**, 084101, (2012).
- [30] Weihua Geng and S. Zhao, Fully implicit ADI schemes for solving the nonlinear Poisson-Boltzmann equation, *Molecular Based Mathematical Biology*, **1**, 109-123, (2013).
- [31] Steve Rosencrans, Xuefeng Wang, and S. Zhao, Estimating eigenvalues of an anisotropic thermal tensor from transient thermal probe measurements, *Discrete and Continuous Dynamical Systems*, **33**, 5441-5455, (2013).
- [32] L. Mu, J. Wang, G.W. Wei, X. Ye, and S. Zhao, Weak Galerkin methods for second order elliptic interface problems, *Journal of Computational Physics*, **250**, 106-125, (2013).
- [33] S. Zhao, Operator splitting ADI schemes for pseudo-time coupled nonlinear solvation simulations, *Journal of Computational Physics*, **257**, 1000-1021, (2014).

- [34] Duc D. Nguyen and S. Zhao, High order FDTD methods for transverse magnetic modes with dispersive interfaces, *Applied Mathematics and Computation*, **226**, 699-707, (2014).
- [35] L. Mu, J. Wang, X. Ye, and S. Zhao, A numerical study on the weak Galerkin method for the Helmholtz equation, *Communication in Computational Physics*, **15**, 1461-1479, (2014).
- [36] Wufeng Tian and S. Zhao, A fast ADI algorithm for geometric flow equations in biomolecular surface generation, *International Journal for Numerical Methods in Biomedical Engineering*, **30**, 490-516, (2014).
- [37] S. Zhao and G.W. Wei, A unified discontinuous Galerkin framework for time integration, *Mathematical Methods in the Applied Sciences*, **37**, 1042-1071, (2014).
- [38] Duc D. Nguyen and S. Zhao, Time-domain matched interface and boundary (MIB) modeling of Debye dispersive media with curved interfaces, *Journal of Computational Physics*, **278**, 298-325, (2014).
- [39] S. Zhao, A matched alternating direction implicit (ADI) method for solving the heat equation with interfaces, *Journal of Scientific Computing*, **63**, 118-137, (2015).
- [40] Y.-B. Yuan, Y.D. Gao, and S. Zhao, Editorial: Machine learning in intelligent video and automated monitoring, *The Scientific World Journal*, **2015**, 570145, (2015).
- [41] Duc D. Nguyen and S. Zhao, A new high order dispersive FDTD method for Drude material with complex interfaces, *Journal of Computational and Applied Mathematics*, **285**, 1-14, (2015).
- [42] W. Deng, X. Zhufu, J. Xu, and S. Zhao, A new discontinuous Galerkin method for the nonlinear Poisson-Boltzmann equation, *Applied Mathematics Letters*, **49**, 126-132, (2015).
- [43] Can Li and S. Zhao, Efficient numerical schemes for fractional water wave models, *Computers and Mathematics with Applications*, **71**, 238-254, (2016).
- [44] Y. Zhang, D.D. Nguyen, K. Du, J. Xu, and S. Zhao, Time-domain numerical solutions of Maxwell interface problems with discontinuous electromagnetic waves, *Advances in Applied Mathematics and Mechanics*, **8**, 353-385, (2016).
- [45] D.D. Nguyen and S. Zhao, A second order dispersive FDTD algorithm for transverse electric Maxwell's equations with complex interfaces, *Computers and Mathematics with Applications*, **71**, 1010-1035, (2016).
- [46] L. Mu, J. Wang, X. Ye, and S. Zhao, A new weak Galerkin finite element method for elliptic interface problems, *Journal of Computational Physics*, **325**, 157-173, (2016).
- [47] L. Wilson and S. Zhao, Unconditionally stable time splitting methods for the electrostatic analysis of solvated biomolecules, *International Journal of Numerical Analysis and Modeling*, **13**, 852-878, (2016).
- [48] Chuan Li and S. Zhao, A matched Peaceman-Rachford ADI method for solving parabolic interface problems, *Applied Mathematics and Computation*, **299**, 28-44 (2017).

- [49] Lunji Song, Kaifang Liu, and S. Zhao, A weak Galerkin method with an over-relaxed stabilization for low regularity elliptic problems, *Journal of Scientific Computing*, **71**, 195-218, (2017).
- [50] W. Geng and S. Zhao, A two-component Matched Interface and Boundary (MIB) regularization for charge singularity in implicit solvation, *Journal of Computational Physics*, **351**, 25-39, (2017).
- [51] L. Song and S. Zhao, Symmetric interior penalty Galerkin approaches for two-dimensional parabolic interface problems with low regularity solutions, *Journal of Computational and Applied Mathematics*, **330**, 356-379, (2018).
- [52] W. Deng, J. Xu, and S. Zhao, On developing stable finite element methods for pseudo-time simulation of biomolecular electrostatics, *Journal of Computational and Applied Mathematics*, **330**, 456-474, (2018).
- [53] J. Hu, S. Zhao, and W. Geng, Accurate pKa computation using matched interface and boundary (MIB) method based Poisson-Boltzmann solver, *Communication in Computational Physics*, **23**, 520-539, (2018).
- [54] L. Song, S. Zhao, and K. Liu, A Relaxed Weak Galerkin Method for Elliptic Interface Problems with Low Regularity, *Applied Numerical Mathematics*, **128**, 65-80, (2018).
- [55] Z. Wei, C. Li, and S. Zhao, A spatially second order alternating direction implicit (ADI) method for solving three dimensional parabolic interface problems, *Computers and Mathematics with Applications*, **75**, 2173-2192, (2018).
- [56] C. Arghya, Z. Jia, L. Li, S. Zhao, and E. Alexov, Reproducing the Ensemble Average Polar Solvation Energy of a Protein from a Single Structure: Gaussian-Based Smooth Dielectric Function for Macromolecular Modeling, *Journal of Chemical Theory and Computation*, **14**, 1020-1032, (2018).

Preprints

- [1] K. Liu, L. Song, S. Zhao, and Y. Wu, An over-penalized weak Galerkin method with a stabilizer for second-order elliptic problems, *Applied Numerical Mathematics*, submitted, (2018).

Conference Publications

- [1] S. Zhao, and G.W. Wei, The discrete singular convolution for pricing the European and American options, Proceedings of Second International ICSC Symposium on Computational Intelligence: Methods and Applications, L.I. Kuncheva, ed., ICSC Academic Press, Canada/The Netherlands, pp. 387-393, (2001).
- [2] G. Bao, G.W. Wei, and S. Zhao, A new algorithm for solving the Helmholtz equation with high wavenumbers, in Proceeding of the third International Workshop on Scientific Computing and Applications, ed. by Y.Y. Lu, W.W. Sun, and T. Tang, Science Press, Beijing, pp. 55-67, (2004).

- [3] G. Bao, G.W. Wei, and S. Zhao, A wavelet-collocation approach for computational electromagnetics, Proceeding of the 20th Annual Review of Progress in Applied Computational Electromagnetics, Paper No. 92004100466, (2004).
- [4] G. Bao, G.W. Wei, and S. Zhao, A wavelet-collocation method for solving the Helmholtz equation with high wavenumbers, Proceeding of the 20th Annual Review of Progress in Applied Computational Electromagnetics, Paper No. 92004100467, (2004).
- [5] S. Zhao and G.W. Wei, High-order FDTD methods via derivative matching for electromagnetic computation involving material interfaces, Proceeding of the 20th Annual Review of Progress in Applied Computational Electromagnetics, Paper No. 92004100468, (2004).

Software Packages

- Regularized Matched Interface and Boundary Poisson-Boltzmann Solver. <http://faculty.smu.edu/wgeng/research/rMIB.html> (2018).

Meetings and Symposia

- SIAM Conference on the Life Sciences, Minneapolis, August 6 - 9, 2018.
- Computational Aspects of Time Dependent Electromagnetic Wave Problems in Complex Materials, ICERM, Brown University, June 25 - 29, 2018
- Mathematics in Action (MiA2018): Modeling and analysis in molecular biology and electrophysiology, Suzhou, China, June 16 - 18, 2018.
- 30th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama at Birmingham, Nov. 4, 2017.
- The 3rd Annual Meeting of SIAM Central States Section, Colorado State University, Sept. 29 - Oct. 1, 2017.
- Workshop of Mathematics Biophysics and Molecular Biosciences, Tsinghua Sanya International Mathematics Forum, Sanya, China, Dec. 19 - 23, 2016.
- 20th IMACS World Congress, Xiamen, China, Dec. 10 - 14, 2016.
- 29th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Nov. 5, 2016.
- The second Annual Meeting of SIAM Central States Section, University of Arkansas at Little Rock, Sept. 30 - Oct. 2, 2016.
- SIAM Conference on the Life Sciences, Boston, July 11 - 14, 2016.
- The Tenth International Conference on Scientific Computing and Applications, Fields Institute, Toronto, Canada, June 6 - 10, 2016.
- 40th Annual SIAM Southeastern Atlantic Section Conference, University of Georgia, March 12 - 13, 2016.
- 28th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Huntsville, Nov. 7, 2015.
- Geometric and Topological Modeling of Biomolecules, Mathematical Biosciences Institute, Ohio State University, Sept. 28 - Oct. 2, 2015.
- Mathematics of Biological Charge Transport: Molecules and Beyond, Institute for Mathematics and its Applications, University of Minnesota, July 20-24, 2015.
- International Conference on Computational Mathematics and Sciences, Xi'an Jiaotong University, China, June 6-8, 2015.
- 1st Annual Meeting of SIAM Central States Section, Missouri University of Science and Technology, April 11-12, 2015.

- 39th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama at Birmingham, March 20-22, 2015.
- 27th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Birmingham, Nov. 8, 2014.
- Ninth Mississippi State Conference on Differential Equations & Computational Simulations, Mississippi State University, Oct. 23 - 25, 2014.
- SIAM Conference on the Life Sciences, Charlotte, NC, August 4 - 7, 2014.
- Fourth Workshop on Recent Advances on Spectral Methods and Related Applications, Xiamen University, China, Nov. 2 - 4, 2013.
- New Mathematical Developments Arising from Ecology, Epidemiology and Environmental Science, Beijing International Center for Mathematical Research, Beijing, China, Oct. 17 - 20, 2013.
- South Central Conference on Advanced Numerical Methods and Applications, University of Arkansas at Little Rock, April 5 - 7, 2013.
- Mathematical Challenges in Biomolecular/Biomedical Imaging and Visualization, Mathematical Biosciences Institute, Ohio State University, Feb. 17 - 22, 2013.
- 25th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Huntsville, Nov. 3, 2012.
- Ninth Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Mississippi State University, Oct. 4 - 6, 2012.
- The Society for Mathematical Biology Annual Meeting and Conference, NIMBioS, University of Tennessee, Knoxville, July 25 - 28, 2012.
- Workshop on Applied Mathematics and Scientific Computing, Lanzhou University, China, June 1 - 2, 2012.
- The second international conference on scientific computing (ICSC12), Nanjing, China, May 22-25, 2012.
- Eighth International Conference on Scientific Computing and Applications, University of Nevada, Las Vegas, April 1 - 4, 2012.
- 36th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama in Huntsville, March 24 - 25, 2012.
- 24th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Birmingham, Nov. 5, 2011.
- 2011 Differential equations weekend conference, Mississippi State University, May 7, 2011.
- Modeling and computation of biomolecular structure and dynamics, Mathematical Biosciences Institute, Ohio State University, April 25 - 29, 2011.
- SIAM Conference on Computational Science and Engineering (CSE11), Reno, Nevada, USA, Feb. 28 - March 4, 2011.
- IMA workshop: Numerical solutions of partial differential equations: novel discretization techniques, University of Minnesota, Nov. 1-5, 2010.
- 23th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Oct. 30, 2010.
- 2010 Annual Meeting of The Society of Mathematical Biology, Federal University of Rio de Janeiro State, Rio de Janeiro, Brazil, July 26 - July 29, 2010.
- Fluid dynamics, Analysis, and Numerics (FAN) 2010, Duke University, North Carolina, June 28-30, 2010.
- Southwest Conference on Integrated Mathematical Methods in Medical Imaging, Arizona

- State University, Tempe, AZ, February 6-7, 2010.
- Metamaterials: Applications, Analysis and Modeling, Institute for Pure & Applied Mathematics, UCLA, January 25-29, 2010.
 - International Conference on Advances in Scientific Computing, Brown University, Providence, RI, December 6-8, 2009.
 - 22th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama in Huntsville, Nov. 7, 2009.
 - The Second International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, University of Alabama in Huntsville, October 9-11, 2009.
 - Workshop on Nano-Bio Mathematics, Michigan State University, East Lansing, MI, August 4, 2009.
 - International Conference on Applied Analysis and Scientific Computation, Shanghai Normal University, Shanghai, China, June 25-28, 2009.
 - Eighth Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Mississippi State University, May 7-9, 2009.
 - Midwest Conference on Mathematical Methods for Images and Surfaces, Michigan State University, East Lansing, MI, April 18-19, 2009.
 - 21th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Birmingham, Nov. 1, 2008.
 - International Conference on Applied Mathematics and Approximation Theory, University of Memphis, Oct 11-13, 2008.
 - 2008 Annual Alabama EPSCoR Conference and Stakeholder Symposium, Montgomery, AL, July 23-24, 2008.
 - IMA Workshop: Quantitative Approaches to Cell Mobility and Chemotaxis, Institute for Mathematics and Its Applications, University of Minnesota, Minneapolis, MN, May 27-30, 2008.
 - AMS special session on Mathematical Modeling in Biology, AMS Spring Southeastern Meeting, Baton Rouge, LA, March 28-30, 2008.
 - Seventh Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Birmingham, Alabama, Nov. 1-3, 2007.
 - 20th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Tuscaloosa, Oct. 27, 2007.
 - Fall 2007 Workshop for Young Researchers in Mathematical Biology (WYRMB), Mathematical Biosciences Institute, Ohio State University, Sept. 11-14, 2007.
 - The 7th International Conference On Spectral and High Order Methods, Institute of Computational Mathematics, Chinese Academic of Sciences, Beijing, China, June 18-22, 2007.
 - Workshop on the occasion of the Establishment of the Wuhan Center of Physical Biology, Huazhong University of Science & Technology, Wuhan, China, May 27-28, 2007.
 - The 2007 Symposium on the Advancement of Magnetic Resonance Spectroscopy and Imaging, Wuhan Institute of Physics and Mathematics, Chinese Academic of Sciences, Wuhan, China, May 26-27, 2007.
 - Nineteenth Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Huntsville, Oct. 21, 2006.
 - Midwest Quantitative Biology Conference, Mackinac Island, Michigan, Sept. 29 - Oct. 1, 2006.

- Workshop on Applications of Methods of Stochastic Systems and Statistical Physics in Biology, University of Notre Dame, Indiana, October 28 - 30, 2005.
- Midwest Numerical Analysis Conference, University of Iowa, Iowa City, IA 52242, USA, May 20-22, 2005.
- QBMI Midwest Computational Structural Biology Workshop, Brook Lodge, Augusta, Michigan, USA, April 30 - May 1, 2005.
- SIAM Great Lakes Section 2005 Spring Meeting, Numerical PDEs, Applications and Modeling, Michigan State University, East Lansing, Michigan, USA, April 16, 2005.
- The 6th International Conference on Spectral and High Order Methods, Brown University, Providence, RI 02912, USA, June 21-25, 2004
- Third International Workshop on Scientific Computing and Applications, January 6-9, City University of Hong Kong, Hong Kong, 2003.
- Inter-Faculty Workshop on Financial Mathematics, National University of Singapore, Singapore, January 12, 2002.
- International Symposium on Computational and Applied PDEs, Zhangjiajie, China, July 1-7, 2001.
- Second International ICSC Symposium on Advanced Computing in Financial Markets, Bangor, Wales, U.K., June 19-22, 2001.
- The Third Asian Symposium on Computer Mathematics, Lanzhou University, Lanzhou, China, August 6-8, 1998.

Selected Talks

- Colloquium, Department of Applied Mathematics, Illinois Institute of Technology, April 2, 2018.
- The 3rd Annual Meeting of SIAM Central States Section, Colorado State University, Sept. 29, 2017.
- Colloquium, School of Mathematics and Statistics, Lanzhou University, Lanzhou, China, July 31, 2017.
- Computational Science Seminar, School of Information Science and Engineering, Lanzhou University, Lanzhou, China, July 27, 2017.
- Biology Seminar, Guangzhou Institute of Biomedicine and Health, Chinese Academy of Sciences, Guangzhou, China, July 25, 2017.
- Colloquium, School of Mathematics, Guangxi Teachers Education University, Nanning, China, July 10, 2017.
- Applied Math seminar, Department of Mathematics and Statistics, Mississippi State University, April 27, 2017.
- Applied Math seminar, Department of Mathematics, University of Alabama, Jan. 27, 2017.
- Colloquium, College of Mathematical Science, Guizhou University, Guiyang, China, Dec. 30, 2016.
- Colloquium, School of Mathematical and Computer Science, Guizhou Normal University, Guiyang, China, Dec. 27, 2016.
- Workshop of Mathematics Biophysics and Molecular Biosciences, Tsinghua Sanya International Mathematics Forum, Sanya, China, Dec. 20, 2016.
- 20th IMACS World Congress, Xiamen, China, Dec. 11, 2016.
- Colloquium, Department of Mathematical Sciences, University of Alabama in Huntsville, Oct. 14, 2016.

- The second Annual Meeting of SIAM Central States Section, University of Arkansas at Little Rock, Oct. 1, 2016.
- SIAM Conference on the Life Sciences, Boston, July 14, 2016.
- SIAM Annual Meeting, Boston, July 13, 2016.
- The Tenth International Conference on Scientific Computing and Applications, Fields Institute, Toronto, Canada, June 7, 2016.
- Computational and Applied Mathematics Seminar, Department of Mathematics, Iowa State University, April 25, 2016.
- 40th Annual SIAM Southeastern Atlantic Section Conference, University of Georgia, March 12, 2016.
- Geometric and Topological Modeling of Biomolecules, Mathematical Biosciences Institute, Ohio State University, Sept. 30, 2015.
- Mathematics of Biological Charge Transport: Molecules and Beyond, Institute for Mathematics and its Applications, University of Minnesota, July 21, 2015.
- Colloquium, Cuiying Honors College, Lanzhou University, Lanzhou, China, June 12, 2015.
- Computational Math Seminar, School of Mathematics and Statistics, Lanzhou University, Lanzhou, China, June 9, 2015.
- International Conference on Computational Mathematics and Sciences, Xi'an Jiaotong University, Xi'an, China, June 6, 2015.
- Colloquium, Department of Applied Mathematics, Xi'an University of Technology, Xi'an, China, June 3, 2015.
- Colloquium, School of Mathematical and Computer Science, Guizhou Normal University, Guiyang, China, May 28, 2015.
- Colloquium, College of Natural Sciences, Guizhou University, Guiyang, China, May 26, 2015.
- Applied Math Seminar, Institute of Software, Chinese Academy of Sciences, Beijing, May 19, 2015.
- 1st Annual Meeting of SIAM Central States Section, Missouri University of Science and Technology, April 11, 2015.
- 39th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama at Birmingham, March 22, 2015.
- Ninth Mississippi State Conference on Differential Equations & Computational Simulations, Mississippi State University, Oct. 24, 2014.
- Applied Math Seminar, Department of Mathematics and Statistics, Auburn University, Sept. 12, 2014.
- Applied Math Seminar, Department of Mathematics, University of Alabama, Sept. 5, 2014.
- SIAM Conference on the Life Sciences, Charlotte, NC, August 5, 2014.
- Colloquium, Beijing Computational Science Research Center, Beijing, March 12, 2014.
- Applied Math Seminar, Beijing Computational Science Research Center, Beijing, Jan. 14, 2014.
- Fourth Workshop on Recent Advances on Spectral Methods and Related Applications, Xiamen University, China, Nov. 3, 2013.
- Applied Math Seminar, Department of Mathematics, Xiamen University, Xiamen, China, Nov. 1, 2013.
- Computational Math Seminar, Department of Mathematics, Communication University

- of China, Beijing, Oct. 16, 2013.
- Computational Biology Seminar, Beijing Computational Science Research Center, Beijing, September 23, 2013.
 - Computational Math Seminar, Institute of Computational Mathematics and Scientific Engineering Computing, Chinese Academy of Sciences, Beijing, September 18, 2013.
 - Applied Math Seminar, Beijing Computational Science Research Center, Beijing, September 10, 2013.
 - Math department research talk, University of Alabama, April 23, 2013.
 - South Central Conference on Advanced Numerical Methods and Applications, University of Arkansas at Little Rock, April 6, 2013.
 - Mathematical Challenges in Biomolecular/Biomedical Imaging and Visualization, Mathematical Biosciences Institute, Ohio State University, Feb. 20, 2013.
 - 25th Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Huntsville, Nov. 3, 2012.
 - Ninth Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Mississippi State University, Oct. 4, 2012.
 - The Society for Mathematical Biology Annual Meeting and Conference, NIMBioS, University of Tennessee, Knoxville, July 26, 2012.
 - Colloquium, College of Natural Sciences, Guizhou University, Guiyang, China, June 13, 2012.
 - Computational Mathematics seminar, Department of Mathematics, Lanzhou University, Lanzhou, China, June 5, 2012.
 - Workshop on Applied Mathematics and Scientific Computing, Lanzhou University, Lanzhou, China, June 1, 2012.
 - The second international conference on scientific computing (ICSC12), Nanjing, China, May 23, 2012.
 - Eighth International Conference on Scientific Computing and Applications, University of Nevada, Las Vegas, April 2, 2012.
 - 36th Annual SIAM Southeastern Atlantic Section Conference, University of Alabama in Huntsville, March 24, 2012.
 - Math department research talk, University of Alabama, Nov. 2, 2011.
 - 2011 Differential equations weekend conference, Mississippi State University, May 7, 2011.
 - Modeling and computation of biomolecular structure and dynamics, Mathematical Bioscience Institute, Ohio State University, April 26, 2011.
 - SIAM Conference on Computational Science and Engineering (CSE11), Reno, Nevada, USA, March 2, 2011.
 - 2010 Annual Meeting of The Society of Mathematical Biology, Federal University of Rio de Janeiro State, Rio de Janeiro, Brazil, July 26, 2010.
 - Math Biology seminar, Department of Mathematics, Michigan State University, March 15, 2010.
 - Applied Mathematics seminar, Department of Mathematics, University of Georgia, October 23, 2009.
 - The Second International Conference on Mathematical Modeling and Analysis of Populations in Biological Systems, University of Alabama in Huntsville, October 11, 2009.
 - Workshop on Nano-Bio Mathematics, Michigan State University, East Lansing, MI, August 4, 2009.

- International Conference on Applied Analysis and Scientific Computation, Shanghai Normal University, Shanghai, China, June 26, 2009.
- Colloquium, School of Mathematical and Computer Science, Guizhou Normal University, Guiyang, China, June 22, 2009.
- Colloquium, College of Natural Sciences, Guizhou University, Guiyang, China, June 16, 2009.
- Eighth Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Mississippi State University, May 9, 2009.
- Midwest Conference on Mathematical Methods for Images and Surfaces, Michigan State University, East Lansing, MI, April 19, 2009.
- International Conference on Applied Mathematics and Approximation Theory, University of Memphis, Oct 12, 2008.
- AMS special session on Mathematical Modeling in Biology, AMS Spring Southeastern Meeting, Baton Rouge, LA, March 29, 2008.
- Seventh Mississippi State - UAB Conference on Differential Equations & Computational Simulations, Birmingham, Alabama, Nov. 2, 2007.
- Computational and Applied Mathematics seminar, School of Mathematics, Georgia Institute of Technology, Sept. 21, 2007.
- The 7th International Conference On Spectral and High Order Methods, Institute of Computational Mathematics, Chinese Academic of Sciences, Beijing, China, June 22, 2007.
- Applied Mathematics seminar, Department of Mathematics, Lanzhou University, Lanzhou, China, June 15, 2007.
- Workshop on the occasion of the Establishment of the Wuhan Center of Physical Biology, Huazhong University of Science & Technology, Wuhan, China, May 27, 2007.
- New Faculty Applied Mathematics Talk Series: Department of Mathematics, University of Alabama, Sept. 27 2006, Oct. 25 2006, Nov. 8 2006, and Jan. 24 2007.
- Applied Mathematics seminar, Department of Mathematics, Tulane University, Nov. 17, 2006.
- Nineteenth Annual University of Alabama System Applied Mathematics Joint Meeting, University of Alabama, Huntsville, Oct. 21, 2006.
- Applied Mathematics seminar, Department of Mathematics, University of Alabama, March 6, 2006.
- Applied Mathematics seminar, Department of Applied Mathematics and Statistics, Johns Hopkins University, March 2, 2006.
- Applied Mathematics seminar, Department of Mathematics and Statistics, South Dakota State University, Feb. 14, 2006.
- Colloquium, Department of Mathematics and Statistics, University of New Mexico, Feb. 6, 2006.
- Applied Mathematics Seminar, Department of Mathematics, The College of William and Mary, Jan. 27, 2006.
- Midwest Numerical Analysis Conference, University of Iowa, May 20, 2005.
- The 6th International Conference on Spectral and High Order Methods, Brown University, June 24, 2004.
- Applied Mathematics Seminar, Department of Mathematics, Michigan State University, Nov. 7, 2003.

- Third International Workshop on Scientific Computing and Applications, City University of Hong Kong, Jan. 8, 2003.
- Inter-Faculty Workshop on Financial Mathematics, National University of Singapore, Jan. 12, 2002.