

Chensong Zhang: Curriculum Vitae

Lab of Science & Engineering Computing	Office: +86 010-8254-1012
Academy of Mathematics and Systems Science	Mobile: +86 135-2040-7990
Chinese Academy of Sciences	ORCID: 0000-0002-2213-0899
Beijing, China	Email: zhangcs@lsec.cc.ac.cn
Google scholar	Web: http://lsec.cc.ac.cn/~zhangcs

Short Bio

Chen-Song Zhang is currently a professor at the Academy of Mathematics and Systems Science, CAS. He obtained his PhD from the *Applied Mathematics & Scientific Computing* program at the *University of Maryland, College Park, US*. His research interests include numerical methods for PDEs, adaptive mesh refinement, petroleum reservoir simulation, and complex fluid/flow simulation.

Employment

March, 2023 — Present: *Professor*
LSEC, Academy of Mathematics and Systems Science, Beijing, China

Sep, 2023 — Present: *Adjunct Professor*
University of CAS, Beijing, China

Sep, 2023 — Present: *Adjunct Professor*
Shenzhen Research Institute of Big Data, Shenzhen, China

March, 2014 — March, 2023: *Associate Professor*
LSEC, Academy of Mathematics and Systems Science, Beijing, China

Aug, 2011 — March, 2014: *Assistant Professor*
LSEC, Academy of Mathematics and Systems Science, Beijing, China

Postdoctoral Positions

July, 2010 — July, 2011: *Postdoctoral Fellow*
Peking University, Beijing, China ★ Mentor: **Zhiping Li**

June, 2007 — Feb, 2011: *CCMA Postdoc & Visiting Assistant Professor*
Penn State University, USA ★ Mentors: **Jinchao Xu, Ludmil Zikatanov**

Visiting Positions

Aug, 2015 — Sep, 2015: *Visiting Professor*
Penn State University, University Park, PA, USA

May, 2014 — July, 2014: *Visiting Professor*
Penn State University, University Park, PA, USA

July, 2009 — Jan, 2010: *Visiting Professor*
Beijing International Center for Mathematical Research, Beijing, China

Education

Ph.D. in Applied Mathematics and Scientific Computing, July 2007
University of Maryland, College Park, MD, USA ★ Advisor: **Ricardo H. Nochetto**
Thesis: *Adaptive Finite Element Method for Variational Inequalities of Parabolic Type*

M.S. in Applied and Computational Mathematics, June 2002
Nanjing University, Nanjing, JS, China ★ Advisor: **Bing-Sheng He**
Thesis: *A modified augmented Lagrangian method for a class of monotone variational inequalities*

B.S. in Computational Mathematics, June 1999
Nanjing University, Nanjing, JS, China ★ GPA: 3.6/4.0

Honors and Awards

- 2021: *CSIAM Certificate for Practical Applications of Applied Mathematics*, China
- 2020: *Best Thematic Track Paper Award*, International Conference on Computational Science
- 2006: *Graduate School Dean Dissertation-Completion Fellowship*, University of Maryland
- 2006: Mathematics Department Dissertation Fellowship, University of Maryland
- 2006: Center for Nonlinear Analysis Summer School Travel Fund, Carnegie Mellon University
- 2006: Seymour Goldberg Award (Spotlight on *Graduate Research*), University of Maryland
- 2001: Nanri *Excellent Thesis Fellowship*, Nanjing University
- 2000: Huawei *Outstanding Students in Computational Science*, Nanjing University
- 1999: Outstanding Student of Nanjing University, Nanjing University
- 1995: *Three-Good Merit High-School Student* of Jiangsu Province, Department of Education

Professional Committees and Services

- Editorial Board, Journal on Numerical Methods and Computer Applications, 2021–present
- PC on Algorithm, Software, and Applications, ORSC, 2023–present
- PC on Mathematics & Industry, CSIAM, 2022–present
- PC on HPC & Math Software, CSIAM, 2021–2022
- Organizing Committee of the SOLVER Conference & SOLVER Challenge, 2018–present
- PC on Numerical Methods for Petroleum & Water Resources, CSIAM, 2016–present
- Operations Research Society of China (ORSC)
- China Society for Industrial and Applied Mathematics (CSIAM)

Research Fundings

- July/2024–Dec/2027: Strategic Priority Research Program of the CAS.
- Jan/2024–Dec/2028: Strategic Priority Research Program of the CAS.
- Jan/2023–Dec/2023: Shale Gas Simulation, RIPED, PetroChina, PI.
- Aug/2022–Aug/2023: Huawei Research Project on Elasticity Solvers, PI.
- Jan/2021–Dec/2025: National Key R&D Program of China 2020YFA0711900.

- Jan/2020–Dec/2021: Collaborative Research Project of PetroBras.
- Jan/2020–Dec/2023: Key Science and Technology Project of PetroChina, UPC.
- Jan/2020–Dec/2023: National Science Foundation of China 11971472, PI.
- Jan/2020–Dec/2020: HiSim Project, RIPED, PetroChina, PI.
- Jan/2019–Dec/2020: Science Challenge Project, TZZT2019-B1.1, PI.
- Jan/2016–Dec/2020: Key Research Program of Frontier Sciences, CAS, QYZDB-SSW-SYS018, PI.
- Jan/2016–Dec/2020: Science Challenge Project, JCKY2016212A503-1-303.
- Jan/2016–Dec/2020: State Key Dev. Prog. for Basic Research, 2016YFB0201304.
- Jan/2016–Dec/2018: Major Research Plan of NSFC, 91530323.
- Jan/2015–Dec/2018: Major Research Plan of NSFC, 91430215.
- Jan/2015–Dec/2015: IAPCM Fundamental Research Fund, PI.
- Jan/2014–Dec/2015: Scientific Research Foundation for Returned Overseas Chinese Scholars, State Education Ministry of China, PI.
- Jan/2012–Dec/2015: National Key Technology Research and Development Program (863) of the Ministry of Science and Technology of China, 2012AA01A3091.
- Jan/2012–Dec/2014: Major Research Plan of NSFC 91130011.
- Oct/2011–Oct/2014: Dean Startup Fund, Academy of Mathematics and System Sciences, PI.
- Jan/2011–Dec/2014: International Collaborative Project of PetroChina, 12HT105000002654.
- Dec/2010–Dec/2012: China Postdoc Science Foundation 45210148–0072, PI.
- Sep/2010: American Mathematical Society Travel Grant, PI.
- Sep/2009–March/2011: National Science and Technology Major Project of the Ministry of Science and Technology of China, CNOOCRC-2010-ZHKY-ZX-008.
- Sep/2009–Aug/2012: US National Science Foundation DMS–0915153, co-PI.

Selected Publications

- [1] *MGCFNN: A neural multigrid solver with novel Fourier neural network for high wave number Helmholtz equations*, Y. Xie, M. Lv, and C.-S. Zhang, The 13th International Conference on Learning Representations (ICLR'25), accepted. CORE2023 Rank A*.
- [2] *A MgNO method for multiphase flow in porous media*, X. Liu, X. Yang, C.-S. Zhang, L. Zhang, and L. Zhao, Proceedings of the 16th Annual Meeting Conference on Porous Media. InterPore 2024, 953–969 (04/2025). Springer, Singapore.
- [3] *A super-localized finite element method for inhomogeneous fourth-order singular perturbation problem*, B. Dai and C.-S. Zhang, Applied Mathematics Letters, 166, 109534 (03/2025). IF2024:2.9.
- [4] *Semi-StructMG: A fast and scalable semi-structured algebraic multigrid*, Y. Zong, C.-S. Zhang, L. Mu et al. The 30th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming (PPoPP'25), 496–511 (02/2025). CCF2022 Rank A.
- [5] *A Stokes-dual-porosity-poroelasticity model and discontinuous Galerkin method for the coupled free flow and dual porosity poroelastic medium problem*, R. Li, C.-S. Zhang, Z. Chen, Journal of Scientific Computing, online first, 102:41 (01/2025). IF2023:2.8.

- [6] *Lowest-degree robust finite element schemes for inhomogeneous bi-Laplace problems*, B. Dai, H. Zeng, C.-S. Zhang, and S. Zhang, *Applied Numerical Mathematics*, 203, 235–254 (09/2024). IF2022:2.994.
- [7] *AutoAMG(θ): An auto-tuned AMG method based on deep learning for strong threshold*, H. Zou, X. Xu, C.-S. Zhang, and Z. Mo, *Communications in Computational Physics*, 36, 200–220 (07/2024). IF2022:3.791.
- [8] *Poster: StructMG: A fast and scalable structured multigrid*, Y. Zong, X. Wang, H. Huang, C.-S. Zhang et al. The 29th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming (PPoPP’24), 478–480 (08/2024). CCF2022 Rank A.
- [9] *Application-oriented preconditioning of seepage mechanics*, C. Feng, S. Li, S. Liu, C.-S. Zhang, L. Zhao, *Chinese Journal of Computational Physics*, 41, 98–109 (01/2024). In Chinese.
- [10] *A Stokes–Darcy–Darcy model and its discontinuous Galerkin method on polytopic grids*, R. Li, Y. Gao, C.-S. Zhang, Z. Chen, *Journal of Computational Physics*, 510, 112780 (01/2024). IF2022:4.645.
- [11] *On the existence of locally-defined projective interpolations*, H. Zeng, C.-S. Zhang, and S. Zhang, *Applied Mathematics Letters*, 146, 108789 (12/2023). IF2023:3.7.
- [12] *An improved multistage preconditioner on GPUs for compositional reservoir simulation*, L. Zhao, S. Li, C.-S. Zhang et al., *CCF Transactions on High Performance Computing*, 5, 144–159 (02/2023). IF2022:0.900.
- [13] *Parallel multi-stage preconditioners with adaptive setup for the black oil model*, L. Zhao, C. Feng, C.-S. Zhang, and S. Shu, *Computers & Geosciences*, 168, 105230 (10/2022). IF2022:5.168.
- [14] *A low-degree strictly conservative finite element method for incompressible flows*, H. Zeng, C.-S. Zhang, and S. Zhang, *SMAI Journal of Computational Mathematics*, 8, 225–248 (09/2022).
- [15] *A new analytical framework for the convergence of inexact two-grid methods*, X. Xu and C.-S. Zhang, *SIAM Journal on Matrix Analysis and Applications*, 43, 512–533 (03/2022). IF2020:1.944.
- [16] *Linear solvers for petroleum reservoir simulation*, C.-S. Zhang, *Journal on Numerical Methods and Computer Applications*, 43, 1–26 (03/2022). In Chinese.
- [17] *Convergence analysis of inexact two-grid methods: A theoretical framework*, X. Xu and C.-S. Zhang, *SIAM Journal on Numerical Analysis*, 60, 133–156 (01/2022). IF2020:3.212.
- [18] *Optimal quadratic element on rectangular grids for H^1 -problems*, H. Zeng, C.-S. Zhang, and S. Zhang, *BIT Numerical Mathematics*, 61, 665–689 (06/2021). IF2020:1.663.
- [19] *An advanced ALE-mixed finite element method for a cardiovascular fluid–structure interaction problem with multiple moving interfaces*, P. Sun, C.-S. Zhang, R. Lan, L. Li, *Journal of Computational Science*, 50, 101300 (01/2021). IF2020:3.976.
- [20] *Monolithic arbitrary Lagrangian–Eulerian finite element method for a multi-domain blood flow – aortic wall interaction problem*, P. Sun, C.-S. Zhang, R. Lan, and L. Li, In: Krzhizhanovskaya V. et al. (eds), *Proceeding of International Conference on Computational Science 2020*. CORE2020 Rank A. *Lecture Notes in Computer Science*, vol 12143, 60–74 (06/2020). Springer, Cham. **Best Thematic Track Paper of ICCS 2020**.
- [21] *A numerical simulator for modeling the coupling processes of subsurface fluid flow and reactive transport processes in fractured carbonate rocks*, T. Yuan, C. Wei, C.-S. Zhang, and G. Qin, *Water*, 11, 1957, 1–18 (10/2019). IF2020:3.103.
- [22] *Distributed Lagrange multiplier/fictitious domain finite element method for a transient Stokes interface problem with jump coefficients*, A. Lundberg, P. Sun, C. Wang, and C.-S. Zhang, *Computer Modeling in Engineering and Sciences*, 119, 35–62 (04/2019). IF2020:1.593.

- [23] *Multiscale hybrid-mixed finite element method for flow simulation in fractured porous media*, P. De-vloo, W. Teng, and C.-S. Zhang, *Computer Modeling in Engineering and Sciences*, 119, 145–163 (04/2019). IF2020:1.593.
- [24] *A new estimate for a quantity involving the Chebyshev polynomials of the first kind*, X. Xu and C.-S. Zhang, *Journal of Mathematical Analysis and Applications*, 476, 302–308 (03/2019). IF2020:1.583.
- [25] *Numerical simulation of an immersed rotating structure in fluid for hemodynamic applications*, W. Leng, C.-S. Zhang, P. Sun, et al., *Journal of Computational Science*, 30, 79–89 (01/2019). IF2020:3.976.
- [26] *On the ideal interpolation operator in algebraic multigrid methods*, X. Xu and C.-S. Zhang, *SIAM Journal on Numerical Analysis*, 56, 1693–1710 (06/2018). IF2018:2.322.
- [27] *ALE method for a rotating structure immersed in fluid and its application to artificial heart pump in hemodynamics*, P. Sun, W. Leng, C.-S. Zhang, et al., In Y. Shi, et al. (eds), *Proceeding of International Conference on Computational Science 2018*. CORE2018 Rank A. *Lecture Notes in Computer Science*, 10862, 9–23 (06/2018), Springer.
- [28] *A new linear solver for fine-scale reservoir simulation*, Z. Li, S. Wu, Q. Li, C.-S. Zhang, et al., *Journal of Numerical Methods and Computer Applications*, 39, 1–9 (03/2018). In Chinese.
- [29] *New perturbation bounds for the spectrum of a normal matrix*, X. Xu and C.-S. Zhang, *Journal of Mathematical Analysis and Applications*, 455, 1937–1955 (11/2017). IF2018:1.188.
- [30] *Analytical decoupling techniques for fully implicit reservoir simulation*, C. Qiao, S. Wu, J. Xu, and C.-S. Zhang, *Journal of Computational Physics*, 336, 664–681 (05/2017). IF2018:2.845.
- [31] *An error-resilient redundant subspace correction method*, T. Cui, J. Xu, and C.-S. Zhang, *Journal of Computing and Visualization in Science*, 18, 65–77 (01/2017).
- [32] *Numerical studies of a class of linear solvers for fine-scale petroleum reservoir simulation*, Z. Li, S. Wu, C.-S. Zhang, and J. Xu, *Journal of Computing and Visualization in Science*, 18, 93–102 (01/2017).
- [33] *An efficient SpMV for petroleum reservoir simulation on GPUs*, Z. Li, C. Feng, S. Shu, and C.-S. Zhang, *Journal of Numerical Methods and Computer Applications*, 37, 315–324 (12/2016). In Chinese.
- [34] *Toward cost-effective reservoir simulation solvers on GPUs*, Z. Li, S. Wu, J. Xu, and C.-S. Zhang, *Advances in Applied Mathematics and Mechanics*, 8, 971–991 (12/2016). IF2018:0.844.
- [35] *Accelerating reservoir simulation on multi-core and many-core architectures with graph coloring ILU(k)*, Z. Li, C. Feng, S. Shu, and C.-S. Zhang, *Information Technology and Intelligent Transportation Systems*, Springer, Switzerland, 454, 221–233 (11/2016).
- [36] *Cost-effective parallel reservoir simulation on shared memory*, S. Wu, B. Wang, Q. Li, J. Xu, C.-S. Zhang, and C. Feng, *SPE Asia Pacific Oil & Gas Conference and Exhibition*, Perth, Australia (10/2016).
- [37] *A stable and scalable hybrid solver for rate-type non-Newtonian fluid models*, Y.-J. Lee, W. Leng, and C.-S. Zhang, *Journal of Computational and Applied Mathematics*, 300, 103–118 (07/2016). IF2018:1.883.
- [38] *An adaptive hybrid stress transition quadrilateral finite element method for linear elasticity*, F.-T. Huang, X.-P. Xie, and C.-S. Zhang, *Journal of Computational Mathematics*, 34, 339–364 (07/2016). IF2018:1.238.

- [39] *On Robust and Efficient Parallel Reservoir Simulation on Tianhe-2*, W. Guan, C. Qiao, H. Zhang, C.-S. Zhang, et al., SPE Reservoir Characterization and Simulation Conference and Exhibition, SPE-175602 (08/2015).
- [40] *A multilevel preconditioner and its shared memory implementation for a new generation reservoir simulator*, S. Wu, J. Xu, C. Feng, C.-S. Zhang, et al., Petroleum Science, 11, 540–549 (10/2014). IF2018:1.846.
- [41] *A multi-stage preconditioner for the black oil model and its OpenMP implementation*, C. Feng, S. Shu, J. Xu, and C.-S. Zhang, Domain Decomposition Methods in Science and Engineering XXI, LNCSE Series, Springer-Verlag Berlin Heidelberg, 129–140 (05/2014).
- [42] *On adaptive Eulerian–Lagrangian method for linear convection-diffusion problems*, X. Hu, Y.-J. Lee, J. Xu, and C.-S. Zhang, Journal of Scientific Computing, 58, 90–114 (01/2014). IF2018:2.370.
- [43] *Numerical study of geometric multigrid on CPU–GPU heterogenous computers*, C. Feng, S. Shu, J. Xu, and C.-S. Zhang, Advances in Applied Mathematics and Mechanics, 6, 1–23 (01/2014). IF2018:0.844.
- [44] *Application of auxiliary space preconditioning in field-scale reservoir simulations*, X. Hu, J. Xu, and C.-S. Zhang, Science China Mathematics, 56, 2737–2751 (12/2013). IF2018:1.031.
- [45] *Multilevel preconditioners for a new generation reservoir simulator*, S. Wu, J. Xu, C.-S. Zhang, et al., SPE Reservoir Characterization and Simulation Conference and Exhibition, SPE-166011 (10/2013).
- [46] *Combined preconditioning with applications in reservoir simulation*, X. Hu, S. Wu, X.-H. Wu, J. Xu, C.-S. Zhang, S. Zhang, and L. Zikatanov, Multiscale Modeling and Simulation, 11, 507–521 (08/2013). IF2017:2.277.
- [47] *Application of an energy-minimizing algebraic multigrid method for subsurface water simulation*, R. Cheng, X. Huang, S. Shu, J. Xu, C.-S. Zhang, S. Zhang, and Z. Zhou, International Journal of Numerical Analysis and Modeling, 10, 374–388 (02/2013). IF2016:0.850.
- [48] *Development of a fast auxiliary space preconditioner for numerical reservoir simulations*, X. Hu, W. Liu, G. Qin, J. Xu, and C.-S. Zhang, SPE Reservoir Characterization and Simulation Conference and Exhibition, SPE-148388, (09/2011).
- [49] *Global existence and uniqueness of solutions to discretized viscoelastic flow models*, Y.-J. Lee, J. Xu, and C.-S. Zhang, Mathematical Models and Methods in Applied Sciences, 21, 1713–1732 (08/2011). IF2015:3.084.
- [50] *Effects of integrations and adaptivity for the Eulerian–Lagrangian method*, J. Jia, X. Hu, J. Xu, and C.-S. Zhang, Journal of Computational Mathematics, 29, 367–395 (06/2011). IF2015:0.731.
- [51] *Stable finite element discretizations for viscoelastic flow models*, Y.-J. Lee, J. Xu, and C.-S. Zhang, Handbook of Numerical Analysis (HNA) Vol. 16, Numerical Methods for Non-Newtonian Fluids, 371–432 (02/2011).
- [52] *Multigrid methods for elliptic obstacle problems on 2D bisection grids*, L. Chen, R. H. Nochetto, and C.-S. Zhang, Domain Decomposition Methods in Science and Engineering XIX, LNCSE Series, Springer-Verlag Berlin Heidelberg, 229–236 (01/2011). ISBN 978-3-642-11303-1.
- [53] *A posteriori error analysis for a class of integral equations and variational inequalities*, R. H. Nochetto, T. von Petersdorff, and C.-S. Zhang, Numerische Mathematik, 116, 519–552 (10/2010). IF2015:1.813.
- [54] *A coarsening algorithm on adaptive grids by newest vertex bisection and its applications*, L. Chen and C.-S. Zhang, Journal of Computational Mathematics, 28, 767–789 (08/2010). IF2015:0.731.

- [55] *Adaptive methods for variational inequalities: theory and applications in option pricing*, C.-S. Zhang, Lambert Academic Publishing, ISBN 978-3-8383-8457-3 (07/2010).
- [56] *Adaptive finite element method for variational inequalities: theory and applications in finance*, C.-S. Zhang, Ph.D. Thesis, University of Maryland, College Park, ISBN 978-0549-32727-1 (07/2007).
- [57] *A posteriori error analysis for parabolic variational inequalities*, K.-S. Moon, R. H. Nochetto, T. von Petersdorff, and C.-S. Zhang, ESAIM: Mathematical Modelling and Numerical Analysis 41, 485–511 (05/2007). IF2009:1.483.
- [58] *AFEM@matlab: A MATLAB package of adaptive finite element methods*, L. Chen and C.-S. Zhang, Tech Report, University of Maryland at College Park (03/2007).
- [59] *A modified augmented Lagrangian method for a class of monotone variational inequalities*, B.-S. He, H. Yang, and C.-S. Zhang, European Journal of Operations Research 159, 35–51 (11/2004). IF2009:2.158.

Invited Conference Talks

- [1] 2025: Workshop on Approximate Computing in Numerical Linear Algebra, Beijing, China
- [2] 2024: Forum on Biomechanics, Beijing, China
- [3] 2024: Algorithm Software and Applications, Operations Research Society of China, Xinxiang, China
- [4] 2024: Summer School on Scientific Computing and Machine Learning, Shenzhen, China
- [5] 2023: HPCMid Workshop, Qingdao, China.
- [6] 2022: Plenary Speaker, International Multigrid Conference, Lugano, Switzerland
- [7] 2021: Summer School for Excellent Math Students, Nanjing University, China
- [8] 2019: International Workshop on Multiphysics Problems, China
- [9] 2019: Modeling & Simulation in Science, Saudi Arabia
- [10] 2018: Lenovo HPC Summit, China
- [11] 2016: International Conference on HPC Middleware, China
- [12] 2015: 4th Brazil–China Conference on Scientific Computing, China
- [13] 2015: 3rd International Conference on HPC and Applications, China
- [14] 2013: Plenary Speaker, 16th National Symposium on Numerical Methods in Fluids, China
- [15] 2013: Plenary Speaker, 4th Elsevier National Library Connect, China
- [16] 2012: Plenary Speaker, 21st Intl. Conference on Domain Decomposition Methods, France
- [17] 2011: Plenary Speaker, Symposium on Computational Science, Engineering and Finance, China

Other Invited Talks

- [1] *Robustness and adaptivity of iterative solvers*, Xiangtan University, Aug 21, 2022.
- [2] *Development of open-source software for multicomponent porous media flow*, Huawei, Shenzhen, July 7, 2022.
- [3] *Numerical methods for problems with moving interface*, ICIAM, Spain, July 17, 2019.
- [4] *Simulation of fluid flow in carbonate reservoirs*, Modeling & Simulation in Science, KAUST, Saudi Arabia, Feb 25, 2019.
- [5] *Simulation of fluid flow in carbonate reservoirs*, TU Delft, Netherlands, Nov 15, 2018.

- [6] *Numerical simulation of an immersed rotating structure in fluid*, CSIAM, Chengdu, Sep 15, 2018.
- [7] *Multiphysics simulation and HPC*, Lenovo HPC Summit, Beijing, Aug 31, 2018.
- [8] *Numerical simulation of discrete fracture networks*, CAM Colloquium, Penn State University, University Park, USA, Apr 30, 2018.
- [9] *Field-scale petroleum reservoir simulation*, Short Course at China University of Petroleum, Qingdao, June 28–30, 2017.
- [10] *Challenges in field-scale petroleum reservoir simulation*, International Workshop on Computational Mathematics for Young Scholars, Shanghai, June 04, 2017.
- [11] *Parallel multilevel iterative methods for coupled PDEs*, International Workshop on Fluid-Structure Interaction Problems, Singapore, June 02, 2016.
- [12] *Parallel petroleum reservoir simulation: numerical methods and their implementation*, Workshop on Large Scale Scientific Computing and Its Applications, Beijing, China, Dec 18, 2015.
- [13] *Multilevel Iterative Methods for Coupled PDEs and Their Parallelization*, 4th China-Brazil Conference on Scientific Computing, Xi'an, China, Sep 24, 2015.
- [14] *High-performance computing and its applications*, CCMA Luncheon Seminar, Penn State Univ, University Park, PA, USA, Aug 31, 2015.
- [15] *Parallel solvers and multilevel methods for coupled PDEs*, 3rd International Conference on HPC and Applications, Shanghai, China, July 26, 2015.
- [16] *FASP solver project*, NX Nastran, SIEMENS Co. Ltd., Shanghai, China, March 24, 2015.
- [17] *Co-Design: From an algebraic solver perspective*, International Workshop on Co-Design, HPC China, Guangzhou, China, Nov 07, 2014.
- [18] *Multilevel preconditioners for multiphase multicomponent flows in porous media*, 1st International Conference of Mathematics, Information and Computational Sciences, Beijing, China, Oct 20, 2014.
- [19] *Multilevel iterative methods for fluid simulations*, 16th National Symposium on Numerical Methods in Fluids, Fenghuang, China, Aug 23, 2013.
- [20] *How to organize 2500 papers: 15 years ago and now*, Elsevier National Library Connect, Nanchang, China, June 18, 2013.
- [21] *Multilevel iterative methods for multiphase multicomponent flows in porous media*, Tsinghua University, Beijing, China, April 26, 2013.
- [22] *Adaptive Eulerian–Lagrangian method for advection–diffusion equations*, Numerical Approximation of Partial Differential Equations, Gargnano, Italy, March 22, 2013.
- [23] *FASP solvers and their applications in petroleum reservoir simulation*, Seminar, China University of Petroleum, Qingdao, China, Oct 07, 2012.
- [24] *Numerical simulation of multiphase multicomponent flows in porous media*, Seminar, Institute of Mechanics, CAS, Beijing, China, Sep 17, 2012.
- [25] *Fast auxiliary space preconditioning: implementation and applications in complex flows*, 21st International Conference on Domain Decomposition Methods, Rennes, France, June 28, 2012.
- [26] *A parallel GAMG solver for the Stokes problem*, 8th International Conference on Scientific Computing and Applications, Las Vegas, US, April 03, 2012.
- [27] *Effective solvers for enhanced oil recovery*, International Symposium on Computational Science, Engineering and Finance, Kunming, China, July 29, 2011.

- [28] *Toward field-scale petroleum reservoir simulation*, PKU–PSU Smart Energy and Environment Workshop, Beijing, China, May 18, 2011.
- [29] *Numerical simulation of enhanced oil recovery with polymer flooding*, Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, Beijing, China, Dec 21, 2010.
- [30] *Software design for petroleum reservoir simulations*, Applied Mathematics Seminar, Xiangtan University, Hunan, China, Nov 06, 2010.
- [31] *Adaptive and multilevel algorithms for parabolic variational inequalities and their applications in finance*, Seminar on Mathematical Finance, Rutgers University, NJ, Oct 08. 2010.
- [32] *Eulerian–Lagrangian methods for complex fluids simulation*, Numerical Analysis Seminar, University of Maryland, College Park, MD, Feb 24, 2010.
- [33] *Multilevel algorithms for complex fluids*, Department of Mathematical Sciences Colloquium, University of Nevada, Las Vegas, NV, Jan 28. 2010.
- [34] *A new coarsening algorithm and its applications in multilevel preconditioning and adaptivity*, Applied Mathematics Seminar, Nanjing University, Nanjing, China, Oct 19, 2009.
- [35] *Multilevel algorithms for complex fluids simulation*, The 19th International Conference on Domain Decomposition Methods, Zhangjiajie, Hunan, China, Aug 17, 2009.
- [36] *Multilevel algorithms for complex fluids simulation*, Numerical Analysis Seminar, University of California, Irvine, CA, May 11, 2009.
- [37] *Adaptive methods for parabolic variational inequalities and their applications in finance*, Computational and Applied Mathematics Colloquium, Penn State University, State College, PA, Jan 25, 2007.

Conference & Workshop (as organizer)

- Aug 2–5, 2025: Solver2025, Qingdao
- July 22–25, 2024: Solver2024, Chengdu
- July 08–19, 2024: CUHK and CUHK–Shenzhen joint summer school on scientific computing and machine learning, Shenzhen, China
- May 18–20, 2024: Numerical algorithms for microfluidic chip simulation, Shenzhen, China
- May 13–16, 2024: Machine learning and big data in porous media, Interpore24, Qingdao, China
- Dec 8–10, 2023: Algorithm, software and applications, Operations Research Society of China
- Aug 7–11, 2023: Solver2023, Xining
- July 20–24, 2022: Solver2022, Chongqing
- Nov 12–14, 2021: Solver2021, Beijing
- June 22–25, 2021: Workshop on scientific computing with applications (dedicated to J. Xu)
- Aug 6–8, 2020: Solver2020, Suzhou
- Sep 6–7, 2019: 5th Workshop on Numerical Methods for PDEs, Beijing
- Aug 15–16, 2019: Solver2019, Kunming
- Aug 11–16, 2019: International Multigrid Conference 2019, Kunming
- Jan 14, 2019: Workshop on High-Performance Numerical Algorithms and Software for Large-Scale Scientific and Engineering Applications, HPC Asia 2019, Guangzhou

- June 22–25, 2018: Solver2018, Shaoshan
- June 1–8, 2018: 5th Workshop on Inter-Facial Dynamics and FSI Problems, Beijing & Sanya
- Dec 5–6, 2015: International Forum on Petroleum Reservoir Simulation, Guangzhou
- Aug 8–9, 2015: Workshop on finite element methods, Beijing
- Aug 5–7, 2015: Short course on multigrid methods and applications, Beijing
- July 15–25, 2013: Workshop on Scientific Computing with Application, Kunming
- March 20–22, 2013: Numerical Approximation of PDEs (dedicated to R. Nochetto)
- Dec 6–7, 2012: International Forum on Petroleum Reservoir Simulation, Beijing
- Oct 28, 2011: Workshop on Mathematical Methods in Petroleum Reservoir Simulation, Beijing
- Aug 01–10, 2011: Workshop on Algebraic Multigrid Methods, Kunming

Teaching Experiences

Fall 2024 <i>Introduction to Multilevel Iterative Methods</i>	Academy of Mathematics and Systems Science
Spring 2023 <i>Introduction to Multilevel Iterative Methods</i>	Academy of Mathematics and Systems Science
Summer 2022 <i>Fast Solvers for Large Algebraic Systems</i>	University of CAS, Online
NJU Summer School 2021 <i>Algorithms and Applications for Supercomputing</i>	Nanjing University, Online
Fall 2016/2018/2020 <i>Introduction to Multilevel Iterative Methods</i>	Academy of Mathematics and Systems Science
PSU–PKU Joint Summer School 2009 <i>Numerical Methods for Partial Differential Equations</i>	Peking University, Beijing
Fall 2008 Graduate Course: <i>Numerical Analysis I – Introduction to Algorithms</i>	Penn State University, State College
Spring 2008 Graduate Course: <i>Advanced Numerical Optimization</i>	Penn State University, State College
PSU–PKU Joint Summer School 2008 <i>Numerical Methods for Partial Differential Equations</i>	Peking University, Beijing
Spring 2009 <i>Calculus II</i>	Penn State University, State College
Spring 2008 <i>Linear Algebra</i>	Penn State University, State College

Fall 2007
Advanced Calculus

Penn State University, State College

Fall 2002, Spring/Fall 2003, Fall 2004
Calculus I/II

University of Maryland, College Park

Software Projects

- **FASP**: A software package for high-performance auxiliary space preconditioners
- **OpenCAEPoro**: An open-source package for multicomponent porous media flow
- **OpenCAXPlus**: An open-source project that combines CAD/CAE/CAM and AI
- **AFEM@matlab**: A Matlab package for adaptive finite element methods (now in **iFEM**)

Graduate Students and Postdocs

- (8) Li Zhao, Postdoc, 2023–present
- (7) Yan Xie, PhD student, 2021–present
- (6) Bin Dai, PhD student, 2020–present
- (5) Shizhe Li, PhD student, 2019–2024
- (4) Kailei Zhang, master student, 2018–2021
- (3) Huilan Zeng, PhD student, 2016–2021
- (2) Ronghong Fan, PhD student, 2015–2020
- (1) Xuefeng Xu, PhD student, 2014–2019

Visiting Scholars and Students

- (7) Boqian Shen, KAUST, Saudi Arabia, 03/2023–07/2023
- (6) Ting Lai, Xiangtan University, China, 07/2021–08/2021
- (5) Huipeng Gu, Southern Univ of Science & Technology, China, 07/2021–08/2021
- (4) Haoran Qi, Penn State University, USA, 09/2020–12/2020
- (3) Wenchao Teng, Chinese Univ of Petroleum, Qingdao, 07/2017–12/2017
- (2) Haifeng Zou, Beijing Univ of Technology, 09/2016–06/2018
- (1) Zheng Li, Xiangtan University, 09/2014–12/2016

Skills

Languages: Chinese (native), English (fluent)

Computer Skills: C/C++, Fortran, MPI/OpenMP, Matlab, Mendeley Advisor

Certificates: Senior Programmer Certificate (now as Software Designer Certificate)

References

Professor Dr. **Bingsheng He**

Department of Mathematics
Nanjing University
Nanjing, JS, 210093, China

Phone: +86 138-1390-5718
Email: hebma@nju.edu.cn
Web: <http://math.nju.edu.cn/~hebma/>

Professor Dr. **Ricardo Nochetto**

Department of Mathematics
University of Maryland
College Park, MD 20742, USA

Phone: +1 301-405-5145
Email: rhn@math.umd.edu
Web: <http://www.math.umd.edu/~rhn>

Professor Dr. **Jinchao Xu**

Department of Mathematics
Penn State University
University Park, PA 16802, USA

Phone: +1 814-865-1110
Email: xu@math.psu.edu
Web: <http://www.math.psu.edu/xu>

Professor Dr. **Jun Hu**

School of Mathematical Sciences
Peking University
Beijing, 100871, China

Phone: +86 136-7137-5669
Email: hujun@math.pku.edu.cn
Web: <http://dsec.pku.edu.cn/~hujun/>

Professor Dr. **Gabriel Wittum**

Applied Math. & Computational Sciences
King Abdullah Univ. of Science & Technology
Thuwal 23955, Saudi Arabia

Phone: +49 170-919-6248
Email: wittum@g-csc.de
Web: <https://cemse.kaust.edu.sa/org/mas>

Professor Dr. **Ludmil Zikatanov**

Department of Mathematics
Penn State University
University Park, PA 16802, USA

Phone: +1 814-880-0146
Email: ludmil@psu.edu
Web: <http://www.personal.psu.edu/ltz1/>