

# Chensong Zhang: Curriculum Vitae

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## Short Bio

Chen-Song Zhang, PhD. He is currently a professor at the Academy of Mathematics and Systems Science, CAS. He graduated from the *Applied Mathematics & Scientific Computing* program at the University of Maryland, College Park, US. Worked as a postdoctoral fellow at the Penn State University, University Park, US. Currently working at the Academy of Mathematics and Systems Science, CAS, China. His main research interests include numerical methods for PDEs, adaptive mesh refinement, petroleum reservoir simulation, and complex fluid/flow simulation.

## 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

## 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 Bid 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

### 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 Memberships and Services

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

### Software Projects

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

## Research Fundings

- 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, TZTZ2019-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] *AutoAMG( $\theta$ ): 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, to appear. IF2022:3.791.
- [2] *Lowest-degree robust finite element schemes for inhomogeneous bi-Laplace problems*, B. Dai, H. Zeng, C.-S. Zhang, and S. Zhang, Applied Numerical Mathematics, online first (05/2024). IF2022:2.994.
- [3] *StructMG: A fast and scalable structured multigrid*, Y. Zong, X. Wang, H. Huang, C.-S. Zhang, X. Xu, J. Sun, B. Yan, Q. Wang, S. Li, Z. Ding, and W. Xue, Poster at PPOPP'24: Proceedings of the 29th ACM SIGPLAN Annual Symposium on Principles and Practice of Parallel Programming, 478–480 (03/2024).
- [4] *Application-oriented preconditioning of seepage mechanics*, C. Feng, S. Li, S. Liu, C.-S. Zhang, L. Zhao, Chinese Journal of Computation Physics, 41, 98–109 (01/2024), in *Chinese*.

- [5] *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.
- [6] *On the existence of locally-defined projective interpolations*, H. Zeng, C.-S. Zhang, and S. Zhang, *Applied Mathematics Letters*, 146, 108789 (12/2023). IF2022:4.294.
- [7] *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.
- [8] *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.
- [9] *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).
- [10] *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.
- [11] *Linear solvers for petroleum reservoir simulation*, C.-S. Zhang, *Journal on Numerical Methods and Computer Applications*, 43, 1–26 (03/2022), in *Chinese*.
- [12] *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.
- [13] *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.
- [14] *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.
- [15] *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 (CORE Rank A)*. *Lecture Notes in Computer Science*, vol 12143, 60–74 (06/2020). Springer, Cham. **Best Thematic Track Paper of ICCS2020.**
- [16] *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.
- [17] *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.
- [18] *Multiscale hybrid-mixed finite element method for flow simulation in fractured porous media*, P. DeVloo, W. Teng, and C.-S. Zhang, *Computer Modeling in Engineering and Sciences*, 119, 145–163 (04/2019). IF2020:1.593.
- [19] *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.
- [20] *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.
- [21] *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.

- [22] *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 (CORE Rank A). Lecture Notes in Computer Science, 10862, 9–23 (06/2018), Springer.
- [23] *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.
- [24] *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.
- [25] *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.
- [26] *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).
- [27] *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).
- [28] *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.
- [29] *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.
- [30] *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).
- [31] *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).
- [32] *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.
- [33] *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.
- [34] *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).
- [35] *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.
- [36] *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).
- [37] *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.

- [38] *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.
- [39] *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.
- [40] *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).
- [41] *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.
- [42] *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.
- [43] *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).
- [44] *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.
- [45] *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.
- [46] *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).
- [47] *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.
- [48] *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.
- [49] *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.
- [50] *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).
- [51] *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).
- [52] *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.
- [53] *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).

- [54] *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 Talks

- 2022: Plenary Speaker, International Multigrid Conference, Lugano, Switzerland
- 2021: Invited Speaker, Summer School for Excellent Math Students, Nanjing University, China
- 2019: Invited Speaker, International Workshop on Multiphysics Problems, China
- 2019: Invited Speaker, Modeling & Simulation in Science, Saudi Arabia
- 2018: Invited Speaker, Lenovo HPC Summit, China
- 2016: Invited Speaker, International Conference on HPC Middleware, China
- 2015: Invited Speaker, 4th Brazil-China Conference on Scientific Computing, China
- 2015: Invited Speaker, 3rd International Conference on HPC and Applications, China
- 2013: Plenary Speaker, 16th National Symposium on Numerical Methods in Fluids, China
- 2013: Plenary Speaker, 4th Elsevier National Library Connect, China
- 2012: Plenary Speaker, 21st Intl. Conference on Domain Decomposition Methods, France
- 2011: Plenary Speaker, Symposium on Computational Science, Engineering and Finance, China

### Other Talks

- [1] *Development of linear solvers for multiphysics problems*, HPCMid, Aug 23, 2023.
- [2] *Robustness and adaptivity of iterative solvers*, Xiangtan University, Aug 21, 2022.
- [3] *Development of open-source software for multicomponent porous media flow*, Huawei, Shenzhen, July 7, 2022.
- [4] *Numerical methods for problems with moving interface*, ICIAM, Spain, July 17, 2019.
- [5] *Simulation of fluid flow in carbonate reservoirs*, Modeling & Simulation in Science, KAUST, Saudi Arabia, Feb 25, 2019.
- [6] *Simulation of fluid flow in carbonate reservoirs*, TU Delft, Netherlands, Nov 15, 2018.
- [7] *Numerical simulation of an immersed rotating structure in fluid*, CSIAM, Chengdu, Sep 15, 2018.
- [8] *Multiphysics simulation and HPC*, Lenovo HPC Summit, Beijing, Aug 31, 2018.
- [9] *Numerical simulation of discrete fracture networks*, CAM Colloquium, Penn State University, University Park, USA, Apr 30, 2018.
- [10] *Field-scale petroleum reservoir simulation*, Short Course at China University of Petroleum, Qingdao, June 28–30, 2017.
- [11] *Challenges in field-scale petroleum reservoir simulation*, International Workshop on Computational Mathematics for Young Scholars, Shanghai, June 04, 2017.
- [12] *Parallel multilevel iterative methods for coupled PDEs*, International Workshop on Fluid-Structure Interaction Problems, Singapore, June 02, 2016.
- [13] *Parallel petroleum reservoir simulation: numerical methods and their implementation*, Workshop on Large Scale Scientific Computing and Its Applications, Beijing, China, Dec 18, 2015.

- [14] *Multilevel Iterative Methods for Coupled PDEs and Their Parallelization*, 4th China-Brazil Conference on Scientific Computing, Xi'an, China, Sep 24, 2015.
- [15] *High-performance computing and its applications*, CCMA Luncheon Seminar, Penn State Univ, University Park, PA, USA, Aug 31, 2015.
- [16] *Parallel solvers and multilevel methods for coupled PDEs*, 3rd International Conference on HPC and Applications, Shanghai, China, July 26, 2015.
- [17] *FASP solver project*, NX Nastran, SIEMENS Co. Ltd., Shanghai, China, March 24, 2015.
- [18] *Co-Design: From an algebraic solver perspective*, International Workshop on Co-Design, HPC China, Guangzhou, China, Nov 07, 2014.
- [19] *Multilevel preconditioners for multiphase multicomponent flows in porous media*, 1st International Conference of Mathematics, Information and Computational Sciences, Beijing, China, Oct 20, 2014.
- [20] *Multilevel iterative methods for fluid simulations*, 16th National Symposium on Numerical Methods in Fluids, Fenghuang, China, Aug 23, 2013.
- [21] *How to organize 2500 papers: 15 years ago and now*, Elsevier National Library Connect, Nanchang, China, June 18, 2013.
- [22] *Multilevel iterative methods for multiphase multicomponent flows in porous media*, Tsinghua University, Beijing, China, April 26, 2013.
- [23] *Adaptive Eulerian-Lagrangian method for advection-diffusion equations*, Numerical Approximation of Partial Differential Equations, Gargnano, Italy, March 22, 2013.
- [24] *FASP solvers and their applications in petroleum reservoir simulation*, Seminar, China University of Petroleum, Qingdao, China, Oct 07, 2012.
- [25] *Numerical simulation of multiphase multicomponent flows in porous media*, Seminar, Institute of Mechanics, CAS, Beijing, China, Sep 17, 2012.
- [26] *Fast auxiliary space preconditioning: implementation and applications in complex flows*, 21st International Conference on Domain Decomposition Methods, Rennes, France, June 28, 2012.
- [27] *A parallel GAMG solver for the Stokes problem*, 8th International Conference on Scientific Computing and Applications, Las Vegas, US, April 03, 2012.
- [28] *Effective solvers for enhanced oil recovery*, International Symposium on Computational Science, Engineering and Finance, Kunming, China, July 29, 2011.
- [29] *Toward field-scale petroleum reservoir simulation*, PKU-PSU Smart Energy and Environment Workshop, Beijing, China, May 18, 2011.
- [30] *Numerical simulation of enhanced oil recovery with polymer flooding*, Institute of Computational Mathematics and Scientific/Engineering Computing, CAS, Beijing, China, Dec 21, 2010.
- [31] *Software design for petroleum reservoir simulations*, Applied Mathematics Seminar, Xiangtan University, Hunan, China, Nov 06, 2010.
- [32] *Adaptive and multilevel algorithms for parabolic variational inequalities and their applications in finance*, Seminar on Mathematical Finance, Rutgers University, NJ, Oct 08, 2010.
- [33] *Eulerian-Lagrangian methods for complex fluids simulation*, Numerical Analysis Seminar, University of Maryland, College Park, MD, Feb 24, 2010.
- [34] *Multilevel algorithms for complex fluids*, Department of Mathematical Sciences Colloquium, University of Nevada, Las Vegas, NV, Jan 28, 2010.



- [35] *A new coarsening algorithm and its applications in multilevel preconditioning and adaptivity*, Applied Mathematics Seminar, Nanjing University, Nanjing, China, Oct 19, 2009.
- [36] *Multilevel algorithms for complex fluids simulation*, The 19th International Conference on Domain Decomposition Methods, Zhangjiajie, Human, China, Aug 17, 2009.
- [37] *Multilevel algorithms for complex fluids simulation*, Numerical Analysis Seminar, University of California, Irvine, CA, May 11, 2009.
- [38] *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)**

- 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 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 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

Spring 2023 <i>Introduction to Multilevel Iterative Methods</i>	Academy of Mathematics and Systems Science
UCAS 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 <i>Advanced Calculus</i>	Penn State University, State College
Fall 2002, Spring/Fall 2003, Fall 2004 <i>Calculus I/II</i>	University of Maryland, College Park

## Graduate Students and Postdocs

- Li Zhao, Postdoc, 2023–present
- Yan Xie, PhD student, 2021–present
- Bin Dai, PhD student, 2020–present
- Shizhe Li, PhD student, 2019–present
- Huilan Zeng, PhD student, 2016–2021 (Tsinghua Univ High School, Beijing)
- Ronghong Fan, PhD student, 2015–2020 (IAPCM, Beijing)
- Xuefeng Xu, PhD student, 2014–2019 (Purdue Univ, USA)

## Visiting Scholars and Students

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

## Skills

Languages: Chinese (native), English (fluent)

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

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