

Curriculum Vitae

ZUOQIANG SHI

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EDUCATION

- Sep. 2003–Jul 2008: Ph.D. in Applied Mathematics, Zhou Pei-yuan Center for Applied Mathematics, Tsinghua University, Beijing, China.
Dissertation: Efficient Semi-Implicit Schemes for Immersed Boundary Method.
Supervisor: Prof. Thomas Y. Hou
- Nov. 2006–Feb. 2008: Special doctoral student in Applied and Computational Mathematics, Caltech, United States and completed the Ph.D. thesis under the direction of Prof. Thomas Y. Hou.
- Sep. 1999–Jul 2003: B.S. in Mathematics, Department of Mathematical Science, Tsinghua University, Beijing, China.

POSITIONS

- Jul. 2016–Current: Associate professor, Yau Mathematical Sciences Center, Tsinghua University.
- Sep. 2011–Jul. 2016: Tenure-track associate professor, Yau Mathematical Sciences Center, Tsinghua University.
- Sep. 2015–Aug. 2016: Visiting Scholar, Department of Mathematics, UCLA.
- Sep. 2008–Sep. 2011 : Postdoctoral Scholar in Applied & Computational Mathematics, Caltech.

RESEARCH INTERESTS

- Numerical methods for PDEs on point cloud;
- PDE models in image processing and data analysis;
- Sparse Time-Frequency representation of nonlinear and nonstationary data;
- Modeling and simulation of the interface problem.

JOURNAL PUBLICATIONS

1. **Zuoqiang Shi** and Jianke Yang, Solitary waves bifurcated from Bloch-band edges in two-dimensional periodic media, *Phys. Rev. E*, **75**, 056602, 2007.
2. Thomas Y.Hou and **Zuoqiang Shi**, An efficient semi-implicit immersed boundary method for the Navier-Stokes equations, *J. Comput. Phys.*, **227**, pp. 8968-8991, 2008.
3. Thomas Y.Hou and **Zuoqiang Shi**, Removing the stiffness of elastic force from the immersed boundary method for the 2D Stokes equations , *J. Comput. Phys.*, **227**, pp. 9138-9169, 2008.
4. **Z. Shi**, J. Wang, Z. Chen and J. Yang, Linear instability of two-dimensional low-amplitude gap solitons near band edges in periodic media, *Phys. Rev. A*, **78**, 063812, 2008.
5. T. Y. Hou, C. Li, **Z. Shi**, S. Wang and X. Yu, On Singularity Formation of a Nonlinear Nonlocal System , *Archive for Rational Mechanics and Analysis*, **199**, pp. 117-144, 2011.
6. Thomas Y. Hou and **Zuoqiang Shi**, Adaptive Data Analysis via Sparse Time-Frequency Representation, *Advances in Adaptive Data Analysis*, **3**, pp. 1-28, 2011.
7. Thomas Y. Hou, **Zuoqiang Shi** and Shu Wang, On Singularity Formation of a 3D Model for Incompressible Navier-Stokes Equations, *Advances in Mathematics*, **230**, pp. 607-641, 2012.
8. Thomas Y. Hou and **Zuoqiang Shi**, Dynamic Growth Estimates of Maximum Vorticity for 3D Incompressible Euler Equations and the SQG Model, *Discrete and Continuous Dynamical System-A*, **32(5)**, pp. 1449-1463, 2012.
9. Thomas Y. Hou and **Zuoqiang Shi**, Data-Driven Time-Frequency Analysis, *Appl. Comput. Harmon. Anal.*, **35**, pp. 284-308, 2013.
10. Y. Shi, K. F. Li, Y. L. Yung, H. H. Aumann, **Z. Shi**, and T. Y. Hou, A Decadal Microwave Record of Tropical Air Temperature from AMSU-A/Aqua Observations, *Climate Dynamics*, **41(5-6)** , pp. 1385-1405, 2013.
11. Thomas Y. Hou and **Zuoqiang Shi**, Sparse Time-Frequency Representation of Nonlinear and Nonstationary Data, *Science China Mathematics*, **56(12)**, pp. 2489-2506, 2013.
12. T. Y. Hou, **Z. Shi** and P. Tavallali, Convergence of a data-driven time-frequency analysis method, *Appl. Comput. Harm. Anal.*, **37(2)**, pp. 235-270, 2014.
13. M. Ci, T. Y. Hou and **Z. Shi**, A Multiscale Model Reduction Method for Partial Differential Equations, *ESAIM:Mathematical Modelling and Numerical Analysis*, **48**, pp. 449-474, 2014.

14. T. Y. Hou, **Z. Shi** and P. Tavallali, Extraction of Intrawave Signals Using Sparse Time-Frequency Representation Method, *SIAM Multiscale Modeling & Simulation*, **12(4)**, pp. 1458-1493, 2014.
15. T. Y. Hou, **Z. Shi** and P. Tavallali, Sparse Time Frequency Representations and Dynamical Systems, accepted by *Commun. Math. Sci.*, **13(3)**, pp. 673-694, 2015.
16. C. Liu, **Z. Shi** and T. Y. Hou, On the Uniqueness of Sparse Time-Frequency Representation of Multiscale Data, *SIAM: Multiscale Modeling & Simulation*, **13(3)**, pp. 790-811, 2015.
17. T. Y. Hou and **Z. Shi**, Extracting a shape function for a signal with intrawave frequency modulation, *Philosophical Transactions A*, 374:20150194, <http://dx.doi.org/10.1098/rsta.2015.0194>, 2016.
18. T. Y. Hou and **Z. Shi**, Sparse Time-Frequency decomposition by dictionary adaptation, *Philosophical Transactions A*, 374:20150192, <http://dx.doi.org/10.1098/rsta.2015.0192>, 2016.
19. Z. Li and **Z. Shi**, A convergent point integral method for isotropic elliptic equations on point cloud, *SIAM: Multiscale Modeling & Simulation*, **14(2)**, pp. 874-905, 2016.
20. Y. Bao, **Z. Shi**, J. L. Beck, H. Li and T. Y. Hou, Identification of time-varying cable tension forces based on adaptive sparse time-frequency analysis of cable vibrations, *Structural Control and Health Monitoring*, doi:10.1002/stc.1889, 2016.
21. Z. Li, **Z. Shi** and J. Sun, Point Integral Method for Solving Poisson-type Equations on Manifolds from Point Clouds with Convergence Guarantees, *Communications in Computational Physics*, **22(1)**, pp. 228-258, 2017.
22. **Z. Shi**, S. Osher and W. Zhu, Weighted Nonlocal Laplacian on Interpolation from Sparse Data, *Journal of Scientific Computing*, <https://doi.org/10.1007/s10915-017-0421-z>, 2017.
23. **Zuoqiang Shi**, Enforce the Dirichlet boundary condition by volume constraint in Point Integral method, *Commun. Math. Sci.*, **15(6)**, pp. 228-258, 2017.
24. C. Liu, **Z. Shi** and T. Y. Hou, A Two-Level Method for Sparse Time-Frequency Representation of Multiscale Data, *Science China Mathematics*, **60(10)**, pp. 1733-1752, 2017.
25. **Z. Shi** and J. Sun, Convergence of the Point Integral method for Poisson equation on point cloud, *accepted by Research in the Mathematical Sciences*, 2017.
26. S. Osher, **Z. Shi** and W. Zhu, Low dimensional manifold model for image processing, *accepted by SIAM Journal on Imaging Sciences*, 2017.

27. S. Yu, J. Ma, S. Osher and **Z. Shi**, Noise attenuation in a low dimensional manifold, *Geophysics*, **82(5)**, pp. V321-V334, 2017.
28. Y. Bao, **Z. Shi**, X. Wang and H. Li, Compressive sensing of wireless sensors based on group sparse optimization for structural health monitoring, *accepted by Structural Control and Health Monitoring*, 2017.
29. D. Kuang, **Z. Shi**, S. Osher and A. Bertozzi, A Harmonic Extension Approach for Collaborative Ranking, *International Symposium on Nonlinear Theory & Its Applications (NOLTA)*, 2017.
30. **Z. Shi**, S. Osher and W. Zhu, Generalization of the Weighted Nonlocal Laplacian in Low Dimensional Manifold Model, *Journal of Scientific Computing*, <https://doi.org/10.1007/s10915-017-0549-x>, 2017.
31. T. Y. Hou and **Z. Shi**, Sparse Time-Frequency decomposition for multiple signals with same frequencies, *accepted by Advances in Data Science and Adaptive Analysis*, 2017.
32. **Z. Shi**, J. Sun and Minghao Tian, Harmonic extension on point cloud, *accepted by SIAM Multiscale Modeling & Simulation*, 2017.

GRANTS

- PI, NSFC Project 11671005, Data-Driven sparse Time-Frequency decomposition, 2017-2020.
- Co-PI, NSFC Project 11371220, Variational problem in discrete transport, Minkowski problem and Monge-Ampere equation, 2014-2017.
- PI, NSFC Project 11201257, Efficient and stable schemes for Immersed Boundary method, 2013-2015.

ACADEMIC ACTIVITIES

- Invited talk at "International Conference: Nonlinear Waves - Theory and Applications", Tsinghua University, Beijing, China, Jun. 9-12, 2008.
- Talk at "ACM Colloquia", Caltech, Mar. 9, 2009.
- Invited talk at "The Second International Conference: Nonlinear Waves - Theory and Applications", Tsinghua University, Beijing, China, Jun. 26-29, 2010.
- Invited talk at Zhou Pei-yuan Center for Applied Mathematics, Tsinghua University, Beijing, China, Jul. 19, 2010.
- Talk at AMS 2010 Fall Western Section Meeting, UCLA, Oct. 9-10, 2010.

- Talk at Tsinghua Sanya International Mathematics Forum, Sanya, Dec. 19-21, 2011.
- Invited talk at International Workshop on Recent Advances in Scientific and Engineering Computing, Shanghai Jiaotong University, Oct. 20-22, 2012.
- Invited talk at Workshop on Adaptive Data Analysis and Sparsity, IPAM, UCLA, Jan. 28-31, 2013.
- Invited talk at Research Center for Adaptive Data Analysis, National Central University, Taiwan, Apr. 29, 2013.
- Invited talk at Department of Mathematics, National Central University, Taiwan, May 2, 2013.
- Invited talk at ICMSEC, Chinese Academy of Sciences, Beijing, Jan. 16, 2014.
- Invited talk at National Tsing Hua University, Hsinchu, Taiwan, Mar. 18, 2014.
- Invited talk at IAPCM, Beijing, Sep. 19, 2014.
- Invited talk at workshop on Recent Advances in Numerical Analysis, Shanghai Jiao Tong University, Nov. 15-16, 2014.
- Invited keynote talk at workshop on Statistics and Computational Interface to Big Data, Hong Kong, Jan. 4-16, 2015.
- Invited talk at International Conference on Optimization, Sparsity and Adaptive Data Analysis, Mar. 18-22, 2015.
- Invited talk at Department of Mathematics, National Chiao-Tung University, Hsinchu, Taiwan, Apr. 17, 2015.
- Invited talk at Department of Mathematics, Peking University, Mar. 31, 2015.
- Invited talk at Beijing Computational Science Research Center, May 12, 2015.
- Invited talk at Department of Mathematics, UCR, Oct. 28, 2015.
- Invited talk at Department of Mathematics, UCLA, Feb. 2, 2016.
- Invited talk at Department of Mathematics, UCSB, Feb. 5, 2016.
- Invited talk at workshop on Shape Analysis and Learning by Geometry and Machine, IPAM, Feb. 12, 2016.
- Invited talk at Department of Mathematics, Harvard University, Feb. 18, 2016.

- Invited talk at School of Civil Engineering, Harbin Institute of Technology, May 20, 2016.
- Invited talk at Department of Mathematics, UCI, Jun. 6, 2016.
- Invited talk at PRCM, Seoul, Jul. 4, 2016.
- Invited talk at Department of Mathematics, UCLA, Aug. 16, 2016.
- Invited talk at Department of Mathematics, HKUST, Oct. 28, 2016.
- Invited talk at ICMSEC, Beijing, Nov. 10, 2016.
- Invited talk at workshop on dynamical system and related topics, HUST, Nov. 20, 2016.
- Invited talk at workshop on Imaging and Algorithm, BCSRC, Dec. 16, 2016.
- Invited talk at SPOC, Nankai Univeristy, Dec. 18, 2016.
- Invited talk at Department of Mathematics, HKBU, Jul. 6, 2017.
- Invited talk at Stepping Stone Symposium on Theoretical and Numerical Analysis of PDEs, Geneva, Aug. 29, 2017.
- Invited talk at workshop on Variational methods and effective algorithms for imaging and vision, Isaac Newton Institute, Cambridge, Sep. 6, 2017.
- Invited talk at Beijing-Tianjin-Hebei conference on Computational Mathematics, Sep. 10, 2017.
- Invited talk at Department of Mathematics, Peking University, Sep. 19, 2017.