

Curriculum Vitae

HAO WU

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Personal Information Born on Jan. 1983 in Anhui Province, P.R. China.

Education Experiences

- Ph.D. in Mathematics, Tsinghua University, Jul. 2009.
 - Thesis Advisor: Prof. Shi Jin
 - Thesis Title: Fast computational methods for high frequency waves
- B.S. in Mathematics, Tsinghua University, Jul. 2004.

Research Interests

- Inverse Problem in Seismology
- Optimal Transport Problems
- High Frequency Waves
- Big Data and Quantitative Finance

Academic Experiences

- Regular position
 - Assistant Dean, Sep. 2017 - , Department of Mathematical Sciences, Tsinghua University.
 - Associate Professor (tenured), Dec. 2016 - , Department of Mathematical Sciences, Tsinghua University.
 - Associate Professor (tenure track), Dec. 2013 - Nov. 2016, Department of Mathematical Sciences, Tsinghua University.
 - Assistant Professor, Jun. 2011 - Nov. 2013, Department of Mathematical Sciences, Tsinghua University.
 - Research Associate, Jul. 2009 - May. 2011, Department of Mathematical Sciences, Tsinghua University.
- Visiting positions
 - Visiting fellow of the program (Partial Differential Equations in Kinetic Theories), Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK, Sep. 2010 and Dec. 2010.

- Postdoctoral fellow(Supervisor: Prof. Naoufel Ben Abdallah), Institute of Mathematics, University of Paul Sabatier(Toulouse III), France, Nov. 2009 – Oct. 2010.
- Visiting student, Mathematics Department, University of Wisconsin-Madison, USA, Sep. 2007 – Aug. 2008.
- Visiting student, Wolfgang Pauli Institute, University of Vienna, Austria, Feb. 2007 – Mar. 2007.

Awards

- Academic
 - [1] Award of nomination for Excellent Doctoral Dissertation of China, Academic Degrees Committee of the State Council, 2012.
 - [2] Excellent Youth Paper Award, Chinese Society for Computational Mathematics, 2011.
 - [3] Excellent Doctoral Dissertation and Outstanding Ph.D. Graduation Award, Tsinghua University, 2009.
- Teaching and Service
 - [4] Excellent Youth-Teaching Award, Tsinghua University, 2017.
 - [5] Outstanding award of Class tutor, Tsinghua University, 2015.
 - [6] Meritorious award of Class tutor, Tsinghua University, 2013.
 - [7] Outstanding award for Youth-Teaching Contest of Universities in Beijing, Educational Committee of Beijing, 2013.
 - [8] Outstanding award for Youth-Teaching Contest of Tsinghua University, Tsinghua University, 2013.

Research Grants

- Current Grants
 - [1] Participator, NSFC Project 41390452, *Math-physics models for the unconventional oil/gas reservoirs and their solutions*, 2014-2018.
 - [2] Participator, NSFC Project 91330203, *Computational Methods for Multi-scale, Multi-physics Transport Problems in Hyperbolic Vehicles*, 2014-2017.
 - [3] Participator, NSFC Project 41230210, *The full waveform inversion for lithosphere structure and its applications*, 2013-2017.
- Past Grants
 - [4] PI, NSFC Project 11101236, *Efficient and accurate schemes for Schrödinger equation with discontinuous potential*, 2012-2014.
 - [5] PI, SRF for ROCS-SEM, *Efficient numerical methods for Schrödinger equation with singular potential*, 2013-2015.
 - [6] Participator, NSFC Project 11071139, *Coupling methods for multiscale problems based on eigenfunction expansion*, 2011-2013.
 - [7] Participator, NSFC Project 10971115, *Numerical simulation of waves in periodic structures*, 2010-2012.

- [8] Participator, NSAF Project 10676017, *Study of the Euler numerical methods for large deformation multi-phase flow with high temperature and high density*, 2007-2009.

Former Students

- [1] Dr. Xijun He, Ph.D. in Jul. 2015, co-advisor. First job after graduation: China Aerospace Science and Industry Group.
- [2] Ms. Zhongjun Wu, Msc Degree in Jul. 2015 (Outstanding Master Graduation Award in Beijing). First job after graduation: The People's Bank of China, Kunming Central Sub-branch.

Current Students

- [1] Mr. Jing Chen, Ph.D. student since Sep. 2016.
- [2] Mr. Guoxu Chen, Ph.D. student since Sep. 2018.
- [3] Ms. Wanyi Zheng, Master student since Sep. 2017.

Research Activities

- Conference speeches and posters

- [1] *The 2017 Annual meeting of Chinese Geoscience Union Mini-symposium on "Topic 50. Seismic wave propagation and imaging"*, Beijing International Convention Center, Oct 15-18, 2017. **(contributed talk)**
- [2] *CSRC Summer School on Applied Inverse Problems*, Beijing Computational Science Research Center (CSRC), Beijing, China, Aug. 7-11, 2017. **(invited talk)**
- [3] *The 2017 annual meeting of NSFC key project "Computational Methods for Multi-scale, Multi-physics Transport Problems in Hyperbolic Vehicles"*, Shanghai Jiao Tong University, Shanghai, China, May 20, 2017. **(invited talk)**
- [4] *Workshop on Recent Advances in Scientific and Engineering Computation*, Shanghai Jiao Tong University, Shanghai, China, May 4-7, 2017. **(invited talk)**
- [5] *The 10th International Conference on Computational Physics Mini-symposium on "C4. Numerical Methods of Nonlinear Problems"*, Macao SAR, Jan. 16-20, 2017. **(invited talk)**
- [6] *The 2016 Annual meeting of Chinese Geoscience Union Mini-symposium on "Topic 46. Seismic wave propagation and imaging"*, Beijing International Convention Center, Oct 14-18, 2016. **(invited talk)**
- [7] *2016 Workshop of Beijing-Tianjin-Hebei Society for Computational Mathematics*, Tianjing, China, Sep. 1-3, 2016. **(invited talk)**
- [8] *The Fourth International Conference Nonlinear Waves - Theory and Applications*, Beijing, China, Jun 25-28, 2016. **(invited talk)**
- [9] *Workshop on Frontiers in Computational and Applied Mathematics*, Tsinghua University, Beijing, China, Nov. 21-22, 2015. **(invited talk)**

- [10] *The 9th International Conference on Computational Physics Mini-symposium on “A1. Numerical Methods for Kinetic Equations” and “A2. Numerical Simulation of Quantum and Kinetic Problems”*, National University of Singapore, Singapore, Jan. 7-11, 2015. **(invited talk)**
- [11] *Workshop on Mathematical and Numerical Methods for Quantum, Kinetic and Non-local Problems*, Beijing Computational Science Research Center, Beijing, China, May 22-24, 2014. **(invited talk)**
- [12] *The 12th Quadrennial meeting of Chinese University Society for Computational Mathematics*, National University of Defense Technology, Changsha, Hunan, China, Oct. 19-23, 2013. **(contributed talk)**
- [13] *2013 Workshop of Beijing Society for Computational Mathematics*, Beijing, China, Sep. 6, 2013. **(contributed talk)**
- [14] *2012 Workshop of Beijing Society for Computational Mathematics*, Weihai, Shandong, China, Jul. 6-8, 2012. **(invited talk)**
- [15] *SIAM Conference on Nonlinear Waves and Coherent Structures*, Seattle, USA, Jun. 13-16, 2012. **(invited talk)**
- [16] *International Conference in Applied Mathematics*, Shanghai Jiao Tong University, Shanghai, China, Apr. 16-22, 2012. **(invited talk)**
- [17] *The 9th Quadrennial meeting of Chinese Society for Computational Mathematics*, Zhengzhou, China, Sep. 19-22, 2011. **(contributed talk)**
- [18] *The fifth Workshop of Young Chinese Computational Mathematicians*, Shanghai Jiao Tong University, Shanghai, China, Aug. 13-14, 2011. **(invited talk)**
- [19] *2011 International Conference on Applied Mathematics and Interdisciplinary Research*, Nankai University, Tianjin, China, Jun 13-16, 2011. **(contributed talk)**
- [20] *Kinetic Models of Classical and Quantum Particle Systems: a Conference in the Memory of Naoufel Ben Abdallah*, Toulouse, France, Mar. 14-18, 2011. **(invited talk)**
- [21] *International Congress of Chinese Mathematicians*, Tsinghua University, China, Dec. 17-22, 2010. **(contributed talk)**
- [22] *PDE Models for Quantum Fluids*, Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK, Dec. 13-17, 2010. **(invited talk)**
- [23] *ESF Research Conferences - Highly Oscillatory Problems: From Theory to Applications*, Isaac Newton Institute, University of Cambridge, UK, Sep. 12-17, 2010. **(contributed talk)**
- [24] *2010 Frontiers of computational and applied mathematics*, Suzhou University, China, Jul. 31 - Aug. 1, 2010. **(invited talk)**
- [25] *DEASE QUATRRAIN meeting: PDEs for Engineering NanoScience and Biology*, Hotel Le Royal Hammamet, Tunisia, May 17-21, 2010. **(invited talk)**
- [26] *IP 2010 - MathNanoSci Intensive Programme*, University of L’Aquila, Italy, May 3-21, 2010. **(ten hours mini course)**
- [27] *Workshop on Frontiers of Computational and Applied Mathematics*, Tsinghua University, China Aug. 9-10, 2009. **(invited talk)**

- [28] *Workshop on Computational Methods for Quantum, High Frequency and Seismic Waves*, Tsinghua University, China, Dec. 20-21, 2008. **(invited talk)**
- [29] *12th International Conference on Hyperbolic Problems: Theory, Numerics, Applications*, University of Maryland, College Park, USA, Jun. 9-13, 2008. **(contributed talk)**
- [30] *Workshop on Multiscale Modeling, Analysis, and Simulations*, Michigan State Univ., East Lansing, USA, Mar. 27-28, 2008. **(presenting poster)**
- Conference Organized:
 - [1] *Mathematical Model and Computation of Nonlinear Problems*, Tsinghua Sanya International Mathematics Forum, Sanya, Hainan, Jan. 15-19, 2018.
 - [2] *The Youth Forum in the 15th Annual Meeting of CSIAM*, Qingdao, Shandong, China, Oct. 12-15, 2017.
 - [3] *Recent Developments in Seismic Wave Propagation, Imaging and the Continental Dynamics*, Yilong Binhai Hotel, Dali, Yunnan, China, Jun. 6-10, 2017.
 - [4] *The 2016 annual meeting of NSFC key project “Computational Methods for Multi-scale, Multi-physics Transport Problems in Hyperbolic Vehicles”*, Tsinghua University, Beijing, China, Jun. 3-4, 2016.
 - [5] *The 2015 annual meeting of NSFC key project “The full waveform inversion for lithosphere structure and its applications”*, Tsinghua University, Beijing, China, Dec. 18, 2015.
 - [6] *The 2015 annual meeting of NSFC key project “Computational Methods for Multi-scale, Multi-physics Transport Problems in Hyperbolic Vehicles”*, Tsinghua University, Beijing, China, Jul. 10, 2015.
 - [7] *The 8th International Conference on Computational Physics Mini-symposium on “Computational high frequency waves and related problems”*, Hong Kong, Jan. 7-11, 2013.
 - [8] *The 12th Biennially Conference of CSIAM Mini-symposium on “Multiscale computational methods in quantum mechanics and high frequency waves”*, USTC, Hefei, China, Aug. 19-24, 2012.
- Invited colloquia and seminar talks
 - [1] The Institute of Computational Mathematics and Scientific/Engineering Computing of Chinese Academy of Sciences, Jun. 2017.
 - [2] Yau Mathematical Sciences Center, Tsinghua University, May 2017.
 - [3] School of Mathematical Sciences, Peking University, Apr. 2017.
 - [4] Beijing Computational Science Research Center, Jul. 2015.
 - [5] The Institute of Computational Mathematics and Scientific/Engineering Computing of Chinese Academy of Sciences, May 2015.
 - [6] Department of Automation, Tsinghua University, Jun. 2013.
 - [7] Department of Mathematics and Computer Science, Freie Universität Berlin, Dec. 2008.
- Conference Attended:
 - [1] *Workshop on Seismology*, Baiyin, Gansu, China, Sep. 22-25, 2017.

- [2] *Workshop on Numerical Partial Differential Equations and Scientific Computing — On the occasion of Prof. Houde Han's 80th Birthday*, Tsinghua University, Beijing, China, May 27-28, 2017.
- [3] *The Seventh International Congress of Chinese Mathematicians*, Beijing, China, Aug. 7-11, 2016.
- [4] *Computational Seismology*, Tsinghua Sanya International Mathematics Forum, Sanya, Hainan, Jan. 4-8, 2016.
- [5] *2015 Workshop of Beijing Society for Computational Mathematics*, Beijing, China, Jul. 30-31, 2015.
- [6] *8th International Congress on Industrial and Applied Mathematics*, Beijing, China, Aug. 10-14, 2015.
- [7] *2008 AMS Spring Central Section Meeting*, Bloomington, IN, Apr. 5-6, 2008.
- [8] *2007-2008 Program on Random Media, Interface Problems Workshop*, Radisson Hotel in Research Triangle Park, NC, Nov. 15-16, 2007.
- [9] *2007 AMS Fall Central Section Meeting*, Chicago, IL, Oct. 5-6, 2007.
- [10] *Workshop on Computational High Frequency Waves*, Wolfgang Pauli Institute, Univ. of Vienna, Austria, Feb. 21-23, 2007.
- [11] *2006 International Conference on Applied Mathematics and Interdisciplinary Research*, Univ. Nankai, Tianjin, China, Jun. 12-15, 2006.

Publications

- [1] S. Jin, H. Wu and Z.Y. Huang, *A Hybrid Phase-Flow Method for Hamiltonian Systems with Discontinuous Hamiltonians*, SIAM Journal on Scientific Computing, 31(2008), no. 2, pp. 1303-1321.
- [2] S. Jin, H. Wu and X. Yang, *Gaussian Beam Methods for the Schrödinger Equation in the Semi-classical Regime: Lagrangian and Eulerian Formulations*, Communications in Mathematical Sciences, 6(2008), no. 4, pp. 995-1020.
- [3] S. Jin, H. Wu and X. Yang, *A numerical study of Gaussian beam methods for the Schrödinger-Poisson equations*, Journal of Computational Mathematics, 28(2010), no. 2, pp. 261-272.
- [4] S. Jin, H. Wu, X. Yang and Z.Y. Huang, *Bloch Decomposition-Based Gaussian Beam Method for the Schrödinger equation with Periodic Potentials*, Journal of Computational Physics, 229(2010), no. 13, pp. 4869-4883.
- [5] S. Jin, H. Wu and X. Yang, *Semi-Eulerian and High Order Gaussian Beam Methods for the Schrödinger Equation in the Semiclassical Regime*, Communications in Computational Physics, 9(2011), no. 3, pp. 668-687.
- [6] H. Wu and X. Yang, *A Hybrid Phase-Flow Method for solving the Liouville Equation in Bounded Domain*, SIAM Journal on Numerical Analysis, 49(2011), no. 2, pp. 733-754.
- [7] N. Ben Abdallah and H. Wu, *A generalized stationary algorithm for resonant tunneling: multi-mode approximation and high dimension*, Communications in Computational Physics, 10(2011), no. 4, pp. 882-898.

- [8] H. Wu, *High order scheme for Schrödinger equation with discontinuous potential I: immersed interface method*, Numerical Mathematics: Theory, Methods and Applications, 4(2011), no. 4, pp. 576-597.
- [9] H. Wu, Z.Y. Huang, S. Jin and D.S. Yin, *Gaussian beam methods for the Dirac equation in the Semi-classical Regime*, Communications in Mathematical Sciences, 10(2012), no. 4, pp. 1301-1315.
- [10] H. Wu and X. Yang, *Eulerian Gaussian beam method for high frequency wave propagation in the reduced momentum space*, Wave Motion, 50(2013), no. 6, pp. 1036-1049.
- [11] X.J. He, D.H. Yang and H. Wu, *Numerical dispersion and wave-field simulation of the Runge-Kutta discontinuous Galerkin method*, Chinese Journal of Geophysics-Chinese Edition, 57(2014), no. 3, pp. 906-917.
- [12] X.J. He, D.H. Yang and H. Wu, *A weighted Runge-Kutta discontinuous Galerkin method for wavefield modelling*, Geophysical Journal International, 200(2015), no. 3, pp. 1389-1410.
- [13] J.T. Huang, H. Wu and W.A. Yong, *On Initial Conditions for the Lattice Boltzmann Method*, Communications in Computational Physics, 18(2015), no. 2, pp. 450-468.
- [14] H. Jing, D.H. Yang and H. Wu, *Dynamic inversion method based on the time-staggered stereo-modeling scheme and its acceleration*, Geophysical Journal International, 207(2016), no. 3, pp. 1675-1687.
- [15] J.S. Li, D.H. Yang, H. Wu and X. Ma, *A low-dispersive method using the high-order stereo-modeling operator for solving wave equations*, Geophysical Journal International, 210(2017), no. 3, pp. 1938-1964.
- [16] H. Wu, J. Chen, X.Y. Huang and D.H. Yang, *A new earthquake location method based on waveform inversion*, Communications in Computational Physics, 23(2018), no. 1, pp. 118-141.
- [17] H. Wu, J. Chen, H. Jing, P. Tong and D.H. Yang, *The auxiliary function method for waveform based earthquake location*, arXiv:1706.05551, 2017.
- [18] J. Chen, Y.F. Chen, H. Wu and D.H. Yang, *The quadratic Wasserstein metric for Earthquake Location*, arXiv:1710.10447, 2017.