Curriculum Vitae

Tiezheng Qian

Current Address

Department of Mathematics
The Hong Kong University of Science and Technology
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Areas of Research Interest

- Mathematical modeling and numerical simulations of complex fluids
- Statistical physics of soft matter
- Multi-scale modeling and simulations
- Macroscopic quantum phenomena

Education

PhD, Institute of Theoretical Physics, Chinese Academy of Sciences, Beijing, China (1997)
M.S., Department of Physics, Zhejiang University, Hangzhou, China (1993)
B.S., Department of Physics, Zhejiang University, Hangzhou, China (1990)

Professional Appointments

- **Assistant Professor**, Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong, China (July 2003 — June 2008)
- **Associate Professor**, Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong, China (July 2008 — June 2016)
- **Professor**, Department of Mathematics, Hong Kong University of Science and Technology, Hong Kong, China (July 2016 — present)

Research Grants

1. Croucher Foundation Z0138, *Laboratory on Multiscale Modeling and Simulations*, HKD 1,000,000 plus HKD 1,000,000 matching from the government, Role: one of the six team members from the Mathematics and Physics Departments.
2. DAG03/04.SC21, *Molecular dynamics simulations and continuum hydrodynamic calculations of cavity flow: The slip boundary condition*, HKD 105,600, PI (2003 – 2011).
3. RGC CERG Project No. 602904, *Meissner effect in nanotube-zeolite complex*, HKD 318,000, PI (Jan 2005 – Dec 2007).
4. RGC CERG Project No. 602805, *Generalization and application of the string method for the study of quantum metastability*, HKD 231,000, PI (Sep 2005 – Feb 2008).
5. RGC Central Allocation CA05/06.SC01, *Multi-Phase Fluid Flow: Theory, Simulation and Experiments*, HKD 3,400,000, Co-I (Feb 2006 – Jan 2009).
6. RGC CERG Project No. 602007, *The effect of fluid slipping on the revolution of spheroid solid particles in shear viscous flow: Simulation and experiment*, HKD 545,000, PI (1 Jan 2008 – 30 Jun 2011).

7. UGC – Targets of Opportunity and Others (AoE-MG/P05/06), *Multiscale phenomena at fluid-solid interfaces: from mathematical analysis to software engineering, microfluidics and lubrication*, HKD 2,500,000, PI (8 PIs in total) (May 2007 – June 2009).
8. RGC DAG Project No. DAG_S09/10.SC03, *A numerical study of the Cassie-Wenzel wetting transition by the string method*, HKD 40,000, PI (1 Jan 2010 – 31 Dec 2014).
9. Research Project Competition (RPC) 2010 Project No. RPC10SC15, *Experimental and mathematical studies of nanoscale fluid-solid interfacial phenomena*, HKD 300,000, Co-I (30 June 2010 – 31 August 2012).
10. RGC General Research Fund Project No. 603510, *Moving Contact Line in One-Component Two-Phase Fluid Systems: Boundary Conditions for Dynamic van der Waals Theory and Numerical Simulations*, HK 655,700, PI (01 Sep 2010 – 28 Feb 2014).
11. Research Project Competition (RPC) 2011 Project No. RPC11SC02, *Short range order and phase transitions in liquid crystals*, HKD 200,000, Co-I (30 June 2011 – 31 August 2013).
12. UGC – Research Infrastructure Grant Project No. FSGRF13SC18, *Mathematical modeling and numerical simulations for the coffee-ring effect exhibited by evaporating droplets in one-component fluids*, HK 50,000, PI (04 Oct 2012 – 03 Oct 2014).
13. RGC General Research Fund Project No. 604013, *Leidenfrost Hydrodynamics of van der Waals Fluids*, HK 592,987, PI (01 Jan 2014 – 31 Dec 2016).
14. RGC Collaborative Research Fund Project C6004-14G, *Dynamics of soft matter at interfaces: Theory, simulations and experiments*, HK 5,100,000, Co-I (01 April 2015 – 31 March 2018).
15. RGC Collaborative Research Fund Project C1018-17G, *Bio-inspired surface engineering for phase change heat transfer: From fundamental understanding to practical applications*, HK 5,471,863, Co-I (2018 – 2021).

Presentations

1. *Power-Law Slip Profile of the Moving Contact Line*, The 8th Hong Kong Society of Theoretical and Applied Mechanics Annual Conference 2003/2004 (Hong Kong, March 2004). Invited
2. *Driven Micro-Cavity Flow: The Slip Boundary Condition*, Workshop on "Nanoscale Material Interfaces: Experiment, Theory and Simulation", Institute for Mathematical Sciences, National University of Singapore (Singapore, January 2005). Invited
3. *Slip Boundary Condition for the Moving Contact Line in Immiscible Two-phase Flows*, Workshop on "Effective Theories for Materials and Macromolecules", Institute for Mathematics and its Applications, University of Minnesota (Minneapolis, June 2005). Invited
4. *Phase Slips in Thin Superconducting Wires: An Accurate Numerical Evaluation Using the String Method*, Workshop on "Ginzburg-Landau Theory and Related Topics", Morningside Mathematics Center, Chinese Academy of Sciences (Beijing, June 2005). Invited
5. *Slip Boundary Condition for the Moving Contact Line in Immiscible Two-phase Flows*, The Second International Conference for Mesoscopic Methods in Engineering and Science, Hong Kong Polytechnic University (Hong Kong, July 2005). Invited
6. *A Variational Approach to the Moving Contact Line Hydrodynamics*, Minisymposium "Multiscale Modeling of Complex Fluids and Solids" as part of The Second International Conference on Scientific Computing and Partial Differential Equations & The First East Asia SIAM Symposium, Hong Kong Baptist University (Hong Kong, December 2005). Invited
7. *A Variational Approach to the Moving Contact Line Hydrodynamics*, Workshop on "Multiscale Modeling: Complex Fluids and Microfluidics", HKUST (Hong Kong, Jan 2006). Invited
8. *Meissner Effect Simulation in Coupled One-dimensional Superconducting Wires*, Hong Kong-Japan Workshop on Carbon Related Nanostructures, organized by The Institute of

Nano Science and Technology, HKUST and Japan Science and Technology Agency, Japan (Hong Kong, April 2006). Invited

9. *On the Moving Contact Line Problem*, Workshop on "A few statistics-related numerical computation problems in condensed matter physics", China Center for Advanced Science and Technology (Beijing, June 2006). Invited

10. *Molecular Hydrodynamics of the Moving Contact Line*, Workshop on Molecular Hydrodynamics, Stochastic Simulation Algorithms, and Kinetic Monte Carlo Methods, Princeton University (Princeton, Oct 2006). Invited

11. *Molecular Hydrodynamics of the Moving Contact Line*, Partial Differential Equation and Numerics Seminar, Mathematics Department, The Pennsylvania State University (Penn State, April 2007). Invited

12. *Molecular Hydrodynamics of the Moving Contact Line*, Workshop on Friction and Wetting, SISSA - the International School for Advanced Studies of Trieste (Trieste, Italy, May 2007). Invited

13. *A Simple Approach to the Moving Contact Line Problem*, Workshop "Frontiers in Computational and Applied Mathematics", Peking University (Beijing, August 2007). Invited

14. *A Scaling Approach to the Derivation of Hydrodynamic Boundary Conditions*, IAS Workshop on Mathematics of Multiscale Problems**,** Hong Kong University of Science and Technology (Hong Kong, December 2007). Invited

15. *A Scaling Approach to the Derivation of Hydrodynamic Boundary Conditions*, Research program on "Nanoscale interfacial phenomena in complex fluids", Kavli Institute for Theoretical Physics China, Chinese Academy of Sciences (Beijing, June 2008). Invited

16. *Modeling and simulations for molecular scale hydrodynamics of moving contact line*, The 8th international conference on condensed matters theory and computational materials science, (Xiangtan, China, July 2009). Invited

17. *Contact Line Motion in Confined Liquid-Gas Systems: Slip vs. Phase Transition*, Workshop on "Scientific Computing and Nonlinear Partial Differential Equations", organized by The School of Mathematical Sciences at Beijing Normal University (JiuZhaiGou National Park, China, June 2010). Invited

18. *Contact Line Motion in Confined Liquid-Gas Systems: Slip vs. Phase Transition*, Workshop on "Computational Problems in Material Sciences", Suzhou University (Suzhou, China, August 2010). Invited

19. *Contact line motion with evaporation and condensation at solid surfaces*, Research program on "Growth of Hierarchical Functional Materials in Complex Fluids", Kavli Institute for Theoretical Physics China, Chinese Academy of Sciences (Beijing, July 2011). Invited

20. *Contact line motion with evaporation and condensation at solid surfaces*, The 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011) Minisymposium "Moving Contact Lines: Computations, Analysis and Applications" (Vancouver, July 2011). Invited

21. *Phase-slip fluctuations in low-dimensional superconductors*, The 7th International Congress on Industrial and Applied Mathematics (ICIAM 2011) Minisymposium "Nucleation and Rare Events: from Theory to Simulations" (Vancouver, July 2011). Invited

22. *Phase-slip fluctuations in low-dimensional superconductors*, Workshop on "Nucleation and Rare Events" in the Program "Mathematical theory and simulation of phase transitions" (Beijing International Center for Mathematical Research, September 2011). Invited

23. *Modeling and simulations of moving contact line: From binary mixtures to one-component liquid-gas systems*, Workshop on "Challenge and Modeling of Multiscale Problems in Mechanics and Materials" in the Program "Multiscale Modeling, Simulation, Analysis and Applications" (Institute for Mathematical Sciences, National University of Singapore, November 2011). Invited

24. *On the derivation of hydrodynamic boundary conditions for complex fluids*, Tutorial lectures in the Tutorial Symposium "Introduction to Complex Fluids" (Department of Mathematics, University of Tokyo, January 2012). Invited

25. *Droplet motion in one-component fluids on solid substrates with wettability and temperature gradients*, International Conference on Applied Mathematics 2012: Modeling, Analysis and Computation (City University of Hong Kong, Hong Kong, May 28 – June 1, 2012). Invited

26. *Modeling and simulation for contact line motion at solid surfaces*, The 17th National Conference on Condensed Matter Theory and Statistical Physics (Lanzhou University, Lanzhou, China, July 2012). Invited

27. *Modeling and simulations for two-phase flows at solid surfaces: a review*, The Hong Kong Mathematical Society Annual General Meeting 2013 (City University of Hong Kong, June 2013). Invited

28. *Modeling and simulations for two-phase flows at solid surfaces*, Research Program "Mathematical Modelling and Analysis of Complex Fluids and Active Media in Evolving Domains" (Isaac Newton Institute for Mathematical Sciences, University of Cambridge, UK, July 2013). Invited

29. *Droplet motion with evaporation and condensation in one-component fluids*, Isaac Newton Institute Workshop "Complex Media in Evolving Domains - a Satellite Meeting at the University of Leeds" (University of Leeds, UK, August 2013). Invited

30. *Droplet motion driven by liquid-vapor transition at three-phase contact line*, Workshop on Modeling Rare Events in Complex Physical Systems (Institute for Mathematical Sciences, National University of Singapore, November 2013). Invited

31. *Droplet motion with evaporation and condensation in one-component fluids*, XJTU-HKUST Joint Workshop on Math, Mechanics, and Aerospace Science and Engineering (Xi'an Jiaotong University, December 2013). Invited

32. *Droplet motion with evaporation and condensation in one-component fluids*, Workshop on "Computational Mathematics for Oil and Gas Applications" in The Second International Conference on Engineering and Computational Mathematics (Hong Kong Polytechnic University, December 2013). Invited

33. *Droplet motion with evaporation and condensation in one-component fluids*, SJTU International Forum on Mathematics (Shanghai Jiaotong University, January 2014). Invited

34. *Droplet motion driven by liquid-vapor transition at three-phase contact line*, HKUST IAS Program on Frontiers of Soft Matter Physics: from Non-equilibrium Dynamics to Active Matter (Hong Kong University of Science and Technology, January 2014). Invited

35. *A numerical study of slippery Jeffery orbits and hydrodynamic reciprocal relations*, 2014 International Conference on Modeling and Simulation of Complex Biological Systems (Chern Institute of Mathematics, Nankai University, June 2014). Invited

36. *Slippery Jeffery orbits and hydrodynamic reciprocal relations*, Mini-symposium "Multiscale methods and applications in computational mechanics" in The 11th World Congress on Computational Mechanics (WCCM XI) (Barcelona, July 2014). Invited

37. *Anisotropic particle in viscous shear flow: Navier slip, reciprocal symmetry, and Jeffery orbit*, HKUST IAS Focused Program on "Multiscale Modeling and Simulation of Defect Problems in Materials Science" (Hong Kong University of Science and Technology, December 2014). Invited

38. *Modeling and simulations of moving contact line: From binary mixtures to one-component liquid-gas systems*, The 12th International Conference for Mesoscopic Methods in Engineering and Science (Beijing Computational Science Research Center, Beijing, July 2015). Invited

39. *A variational approach to a few hydrodynamic problems in soft matter*, Research Program on "Controlled structural formation of soft matter" (Kavli Institute for Theoretical Physics China, Beijing, August, 2015). Invited

40. *A variational approach to thin film hydrodynamics of binary mixtures*, The mini-symposium "Mathematical theories and computational aspects of complex fluids" in The 8th International Congress on Industrial and Applied Mathematics (Beijing, August, 2015). Invited

41. *Anisotropic particle in viscous shear flow: Navier slip, reciprocal symmetry, and Jeffery orbit*, The mini-symposium "Modeling and simulation of complex fluids and biological systems" in The 8th International Congress on Industrial and Applied Mathematics (Beijing, August, 2015). Invited

42. *Dynamic van der Waals theory and its applications*, Forum on Modeling of Nonequilibrium Phenomena (Beijing Computational Science Research Center, Beijing, December 2015). Invited

43. *Dynamic van der Waals theory and its applications*, HKUST IAS focused program on Computational and Mathematical Problems in Materials Science (Hong Kong University of Science and Technology, January 2016). Invited

44. *Onsager's cross coupling effects in gas flows confined to micro-channels*, Workshop on Kinetic Methods for Non-equilibrium Transport (Huazhong University of Science and Technology, June 2016). Invited

45. *Onsager's variational principle and the moving contact line problem*, Invited Session on Drops, Bubbles and Multiphase Flows in The 24th International Congress of Theoretical and Applied Mechanics (Montreal, August 2016). Invited

46. *Phase field modeling and simulations for non‑isothermal transport phenomena in liquid‑vapor systems*, The Hong Kong University of Science and Technology – Beijing Computational Science Research Center Joint Workshop on Computational Science (Hong Kong University of Science and Technology, January 13 and 14, 2017). Invited

47. *Dynamic Van der Waals Theory and Its Applications*, The 10th International Conference on Computational Physics (Macau, January 16 to 20, 2017). Invited

48. *Phase field modeling and simulations for non‑isothermal one‑component liquid‑vapor systems*, Workshop "Numerical Methods for Phase-field models" in the Third International Conference on Engineering and Computational Mathematics (ECM2017) (The Hong Kong Polytechnic University, 31 May to 2 June 2017). Invited

49. *Reciprocal theorem for a phase field model: From local equations to system scale symmetry*, Workshop "Mathematical Approaches to Interfacial Dynamics in Complex Fluids" (Banff International Research Station for Mathematical Innovation and Discovery, June 25 to 30, 2017). Invited

50. *Reciprocal theorem for a phase field model: From local equations to system scale symmetry*, JRI Workshop on numerical partial differential equations (The Hong Kong Polytechnic University, August 28, 2017). Invited

51. *Two-phase flows at solid surfaces: Drops, bubbles and moving contact lines*, Fudan Forum on Computational Physical Science − the 2017 Workshop on Computational Problems in Materials Science (Fudan University, August 29 to 30, 2017). Invited

52. *Reciprocal theorem: From local equations to symmetry over the whole system*, The International Conference on Analysis of Complex Fluids (Shanghai Center for Mathematical Sciences, Fudan University, November 13 to 17, 2017). Invited

53. *Reciprocal theorem: From local equations to symmetry over the whole system*, 2017 NCTS Workshop on nonlinear PDEs (National Center for Theoretical Sciences, National Taiwan University, December 12 to 15, 2017). Invited

54. *Reciprocal theorem: From local equations to symmetry over the whole system*, Outlook of Soft Matter Physics and Its Applications (Beihang University, December 16 to 17, 2017). Invited

55. *Reciprocal theorem: From local equations to symmetry over the whole system*, Research Program "Modeling and Simulation of Interface Dynamics in Fluids/Solids and Their

Applications" (Institute for Mathematical Sciences, National University of Singapore, April 23 to May 25, 2018). Invited

56. *Reciprocal theorem: From local equations to symmetry over the whole system*, Special Session SS12: Numerical methods for phase field models, The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications (National Taiwan University, July 5 to 9, 2018). Invited

57. *Modeling and simulation of drops, bubbles and moving contact lines using the dynamic van der Waals theory*, Special Session SS116: Recent advances on numerical methods and applications of phase-field methods, The 12th AIMS Conference on Dynamical Systems, Differential Equations and Applications (National Taiwan University, July 5 to 9, 2018). Invited

58. *Generalized Lorentz reciprocal theorem in complex fluids and in non-isothermal systems*, International Conference on Interface Problem in Fluid and Solid (South China Research Center for Applied Mathematics and Interdisciplinary Studies, South China Normal University, Guangzhou, June 18 to 21, 2019). Invited

59. *Generalized Lorentz Reciprocal Theorem and Global Onsager's Reciprocal Relations*, The 5th Conference on Condensed Matter Physics (Liyang/Tianmu Lake, Jiangsu Province, China, June 27 to 30, 2019). Invited

60. *A phenomenological approach to the coffee-ring effect with contact line pinning*, Workshop on Modeling, Applied Analysis and Computation of Fluids (Southern University of Science and Technology, Shenzhen, China, October 12 to 14, 2019). Invited

Publication List

A. Papers in Refereed Journals

1. Xinpeng Xu and <u>Tiezheng Qian</u>, *Generalized Lorentz reciprocal theorem in complex fluids and in non-isothermal systems*, Journal of Physics: Condensed Matter **31**, 475101 (2019).

2. Changjuan Zhang, Abbas Fakhari, Jie Li, Li-Shi Luo, and <u>Tiezheng Qian</u>, *A comparative study of interface-conforming ALE-FE scheme and diffuse interface AMR-LB scheme for interfacial dynamics*, Journal of Computational Physics **395**, 602 (2019).

3. Shuo Guo, Xianmin Xu, <u>Tiezheng Qian</u>, Yana Di, Masao Doi and Penger Tong, *Onset of thin film meniscus along a fibre*, J. Fluid Mech. **865**, 650 (2019).

4. Wei Jiang, Quan Zhao, <u>Tiezheng Qian</u>, David J. Srolovitz, and Weizhu Bao, *Application of Onsager's variational principle to the dynamics of a solid toroidal island on a substrate*, Acta Materialia **163**, 154 (2019).

5. Changjuan Zhang, Jie Li, Li-Shi Luo, and <u>Tiezheng Qian</u>, *Numerical simulation for a rising bubble interacting with a solid wall: Impact, bounce, and thin film dynamics*, Physics of Fluids **30**, 112106 (2018).

6. Haiqin Wang, Dadong Yan, and <u>Tiezheng Qian</u>, *A phenomenological approach to the deposition pattern of evaporating droplets with contact line pinning*, J. Phys.: Condens. Matter **30**, 435001 (2018).

7. Tianbai Xiao, Kun Xu, Qingdong Cai, and <u>Tiezheng Qian</u>, *An investigation of non-equilibrium heat transport in a gas system under external force field*, International Journal of Heat and Mass Transfer **126**, 362-379 (2018).

8. M. T. Taylor and <u>Tiezheng Qian</u>, *Numerical simulation of levitating liquid drops using the dynamic van der Waals theory*, Computers and Fluids **155**, 76 (2017).

9. Ruijie Wang, Xinpeng Xu, Kun Xu, and <u>Tiezheng Qian</u>, *Onsager's cross coupling effects in gas flows confined to micro-channels*, Physical Review Fluids **1**, 044102 (2016).

10. M. T. Taylor and <u>Tiezheng Qian</u>, *Thermal singularity and contact line motion in pool boiling: Effects of substrate wettability*, Physical Review E **93**, 033105 (2016).

11. Qian Zhang, <u>Tie-Zheng Qian</u>, and Xiao-Ping Wang, *Phase field simulation of a droplet impacting a solid surface*, Physics of Fluids **28**, 022103 (2016).

12. Shuyu Chen, Han Wang, <u>Tiezheng Qian</u>, and Ping Sheng, *Determining hydrodynamic boundary conditions from equilibrium fluctuations*, Physical Review E **92**, 043007 (2015).

13. Jiaolong Zhang, Xinpeng Xu, and <u>Tiezheng Qian</u>, *Anisotropic particle in viscous shear flow: Navier slip, reciprocal symmetry, and Jeffery orbit*, Physical Review E **91**, 033016 (2015).

14. J. Brannick, C. Liu, <u>T. Qian</u>, and H. Sun, *Diffuse interface methods for multiple phase materials: an energetic variational approach*, Numerical Mathematics: Theory, Methods and Applications **8**, 220 (2015).

15. Xinpeng Xu, Uwe Thiele, and <u>Tiezheng Qian</u>, *A variational approach to thin film hydrodynamics of binary mixtures*, Journal of Physics: Condensed Matter **27**, 085005 (2015).

16. Y. Liu, L. Moevius, X. Xu, <u>T. Qian</u>, J. M. Yeomans, Z. Wang, *Pancake bouncing on superhydrophobic surfaces*, Nature Physics **10**, 515 (2014).

17. Xinpeng Xu and <u>Tiezheng Qian</u>, *Single-bubble dynamics in pool boiling of one-component fluids*, Physical Review E **89**, 063002 (2014).

18. Xinpeng Xu and <u>Tiezheng Qian</u>, *Hydrodynamics of Leidenfrost droplets in one-component fluids*, Physical Review E **87**, 043013 (2013).

19. Congmin Wu, Xinpeng Xu, and <u>Tiezheng Qian</u>, *Molecular dynamics simulations for the motion of evaporative droplets driven by thermal gradients along nanochannels*, Journal of Physics: Condensed Matter **25**, 195103 (2013).

20. Xinpeng Xu and <u>Tiezheng Qian</u>, *Thermal singularity and droplet motion in one-component fluids on solid substrates with thermal gradients*, Physical Review E **85**, 061603 (2012).

21. Xinpeng Xu and <u>Tiezheng Qian</u>, *Droplet motion in one-component fluids on solid substrates with wettability gradients*, Physical Review E **85**, 051601 (2012).

22. Xinpeng Xu, Chun Liu, <u>Tiezheng Qian</u>, *Hydrodynamic boundary conditions for one-component liquid-gas flows on non-isothermal solid substrates*, Communications in Mathematical Sciences **10**, 1027 (2012).

23. Sihong Shao and <u>Tiezheng Qian</u>, *A variational model for two-phase immiscible electroosmotic flow at solid surfaces*, Communications in Computational Physics **11**, 831 (2012).

24. Xinpeng Xu and <u>Tiezheng Qian</u>, *Contact line motion in confined liquid-gas systems: Slip versus phase transition*, J. Chem. Phys. **133**, 204704 (2010).

25. Congmin Wu, <u>Tiezheng Qian</u>, and Ping Sheng, *Droplet spreading driven by van der Waals force: A molecular dynamics study*, J. Phys.: Condens. Matter **22**, 325101 (2010).

26. Congmin Wu, Siulong Lei, <u>Tiezheng Qian</u>, and Xiaoping Wang, *Stick-slip motion of moving contact line on chemically patterned surfaces*, Communications in Computational Physics **7**, 403 (2010).

27. Chunyin Qiu and <u>Tiezheng Qian</u>, *Nucleation of wetting films on cylindrical and spherical substrates: A numerical study by the string method*, J. Chem. Phys. **131**, 124708 (2009).

28. <u>Tiezheng Qian</u>, Congmin Wu, Siu Long Lei, Xiao-Ping Wang, and Ping Sheng, *Modeling and simulations for molecular scale hydrodynamics of moving contact line in immiscible two-phase flows*, Journal of Physics: Condensed Matter **21**, 464119 (2009).

29. Rolf Lortz, Qiucen Zhang, Wu Shi, Justin Ye, Chunyin Qiu, Zhe Wang, Hongtao He, Ping Sheng, <u>Tiezheng Qian</u>, Zikang Tang, Ning Wang, Xixiang Zhang, Jiannong Wang, Che Ting Chan, *Superconducting characteristics of 4Å carbon nanotube-zeolite composite*, Proceedings of the National Academy of Sciences of the United States of America **106**, 7299 (2009).

30. Chunyin Qiu and <u>Tiezheng Qian</u>, *Numerical study of the phase slips in ultrathin doubly connected superconducting cylinders*, Phys. Rev. B **79**, 054513 (2009).

31. Angbo Fang, <u>Tiezheng Qian</u>, and Ping Sheng, *Generalized nematohydrodynamic boundary conditions with application to bistable twisted nematic liquid crystal displays*, Phys. Rev. E **78**, 061703 (2008).

32. Chunyin Qiu, <u>Tiezheng Qian</u>, and Weiqing Ren, *Application of the string method to the study of critical nuclei in capillary condensation*, J. Chem. Phys. **129**, 154711 (2008).

33. <u>Tiezheng Qian</u>, Chunyin Qiu, and Ping Sheng, *A scaling approach to the derivation of hydrodynamic boundary conditions*, Journal of Fluid Mechanics **611**, 333 (2008).

34. Chunyin Qiu and <u>Tiezheng Qian</u>, *Numerical study of the phase slip in two-dimensional superconducting strips*, Phys. Rev. B **77**, 174517 (2008).

35. Chunyin Qiu, <u>Tiezheng Qian</u>, and Weiqing Ren*, Phase slips in superconducting wires with nonuniform cross section: A numerical evaluation using the string method*, Phys. Rev. B **77**, 104516 (2008).

36. Xiao-Ping Wang, <u>Tiezheng Qian</u>, and Ping Sheng, *Moving contact line on chemically patterned surfaces*, Journal of Fluid Mechanics **605**, 59 (2008).

37. Congmin Wu, <u>Tiezheng Qian</u>, and Pingwen Zhang, *Nonequilibrium-molecular-dynamics measurement of the Leslie coefficients of a Gay-Berne nematic liquid crystal*, Liquid Crystals **34**, 1175 (2007).

38. <u>Tiezheng Qian</u>, Weiqing Ren, Jing Shi, Weinan E, and Ping Sheng, *Numerical study of metastability due to tunneling: The quantum string method*, Physica A **379**, 491 (2007).

39. Chunyin Qiu, <u>Tiezheng Qian</u>, and Ping Sheng, *Meissner effect simulation of coupled one-dimensional superconducting wires*, Phys. Rev. B **75**, 024504 (2007).

40. Zuli Xu, <u>Tiezheng Qian</u>, and Ping Sheng, *Phase slips in a one-dimensional superconducting wire: Crossover from quantum tunneling to thermal hopping*, Physica C **450**, 118 (2006).

41. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *A variational approach to the moving contact line hydrodynamics*, Journal of Fluid Mechanics **564**, 333 (2006).

42. Xiongping Luo, Xiao-Ping Wang, <u>Tiezheng Qian</u>, and Ping Sheng, *Moving contact line over undulating surfaces*, Solid State Communications **139**, 623 (2006).

43. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Molecular hydrodynamics of the moving contact line in two-phase immiscible flows*, Commun. Comput. Phys. **1**, 1 (2006).

44. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Hydrodynamic slip boundary condition at chemically patterned surfaces: A continuum deduction from molecular dynamics*, Phys. Rev. E **72**, 022501 (2005).

45. <u>Tiezheng Qian</u>, Weiqing Ren, and Ping Sheng, *Current dissipation in thin superconducting wires: A numerical evaluation using the string method*, Phys. Rev. B **72**, 014512 (2005).

46. <u>Tiezheng Qian</u> and Xiao-Ping Wang, *Driven cavity flow: From molecular dynamics to continuum hydrodynamics*, SIAM Multiscale Modeling and Simulation **3**, 749 (2005).

47. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Power-law slip profile of the moving contact line in two-phase immiscible flows*, Phys. Rev. Lett. **93**, 094501 (2004).

48. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Molecular scale contact line hydrodynamics of immiscible flows*, Phys. Rev. E **68**, 016306 (2003).

49. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Generalized Navier boundary condition for the moving contact line*, Comm. Math. Sci. **1**, 333 (2003).

50. <u>Tiezheng Qian</u>, Zhiliang Xie, Hoi-Sing Kwok, and Ping Sheng, *Dynamic flow, broken surface anchoring, and switching bistability in three-terminal twisted nematic liquid-crystal displays*, J. Appl. Phys. **90**, 3121 (2001).

51. <u>Tiezheng Qian</u> and P. L. Taylor, *From the Thomas-Windle model to a phenomenological description of Case-II diffusion in polymers*, Polymer **41,** 7159 (2000).

52. <u>Tiezheng Qian</u>, Jae-Hoon Kim, Satyendra Kumar, and P. L. Taylor, *Phase-separated composite films: Experiment and Theory*, Phys. Rev. E **61**, 4007 (2000).

53. <u>Tiezheng Qian</u> and P. L. Taylor, *Field-induced phase transitions in antiferroelectric liquid crystals*, Phys. Rev. E **60**, 2978 (1999).

54. <u>Tiezheng Qian</u>, Xiaowei Zhuang, and Y.R. Shen, *Surface-monolayer-induced bulk alignment of liquid crystals: from nematic to smectic A phase*, Phys. Rev. E **59**, 1873 (1999).

55. <u>Tiezheng Qian</u>, *Biaxial ordering and field-induced configurational transition in nematic liquid crystals*, Liquid Crystals **26**, 229 (1999).

56. <u>Tiezheng Qian</u> and Ping Sheng, *Generalized hydrodynamic equations for nematic liquid crystals*, Phys. Rev. E **58**, 7475 (1998).

57. <u>Tie-Zheng Qian</u>, Zhi-Liang Xie, Hoi-Sing Kwok, and Ping Sheng, *Dynamic flow and switching bistability in twisted nematic liquid crystal cells*, Appl. Phys. Lett. **71**, 596 (1997).

58. <u>Tie-Zheng Qian</u> and Ping Sheng, *Orientational states and phase transitions induced by microtextured substrates*, Phys. Rev. E **55**, 7111 (1997).

59. Ya-Sha Yi, <u>Tie-Zheng Qian</u>, and Zhao-Bin Su, *Spin precession and time-reversal symmetry breaking in quantum transport of electrons through mesoscopic rings*, Phys. Rev. B **55**, 10631 (1997).

60. <u>Tie-Zheng Qian</u>, Ya-Sha Yi, and Zhao-Bin Su, *Persistent currents from the competition between Zeeman coupling and spin-orbit interaction*, Phys. Rev. B **55**, 4065 (1997).

61. <u>Tie-Zheng Qian</u> and Ping Sheng, *Liquid crystal phase transitions induced by microtextured substrates*, Phys. Rev. Lett. **77**, 4564 (1996).

62. Xiao-Chun Gao, Jun Gao, <u>Tie-Zheng Qian</u>, and Jing-Bo Xu, *Quantum-invariant theory and the evolution of a quantum scalar field in Robertson-Walker flat spacetimes*, Phys. Rev. D **53**, 4374 (1996).

63. Shao-Jin Qin, <u>Tie-Zheng Qian</u>, Lu Yu, and Zhao-Bin Su, *Breakdown of the quasiparticle picture in the low-density limit of the one-dimensional Hubbard model*, Phys. Rev. B **51**, 16594 (1995).

64. <u>Tie-Zheng Qian</u> and Zhao-Bin Su, *Spin-orbit Interaction and Aharonov-Anandan phase in mesoscopic rings*, Phys. Rev. Lett. **72**, 2311 (1994).

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B. Conference Proceedings

1. Xinpeng Xu and <u>Tiezheng Qian</u>, *Hydrodynamic boundary conditions derived from Onsager's variational principle*, 24th International Congress of Theoretical and Applied Mechanics, Procedia IUTAM **20**, 144 (2017).

2. Xinpeng Xu and <u>Tiezheng Qian</u>, *Evaporative droplets in one-component fluids driven by thermal gradients on solid substrates*, Special Issue "Proceedings of the 17th National Conference on Condensed Matter Theory and Statistical Physics", International Journal of Modern Physics B **27**, 1361008 (2013).
3. <u>Tiezheng Qian</u>, Xiao-Ping Wang, and Ping Sheng, *Hydrodynamic boundary conditions: An emergent behavior of fluid-solid interactions*, Special Issue "Nanoscale Interfacial Phenomena in Complex Fluids", Solid State Communications **150**, 976 (2010).
4. <u>Tiezheng Qian</u>, *Monolayer spreading in confined immiscible fluids: A molecular dynamics simulation*, Proceedings of The Second International Conference for Mesoscopic Methods in Engineering and Science, Computers and Mathematics with Applications **55**, 1554 (2008).
5. Ping Sheng, <u>Tiezheng Qian</u>, and Xiao-Ping Wang, *Hydrodynamic boundary condition at the fluid-solid interface*, Proceedings of International Conference on the Frontiers of Nonlinear and Complex Systems, International Journal of Modern Physics B **21**, 4131 (2007).
6. Ping Sheng, <u>Tiezheng Qian</u>, and Xiao-Ping Wang, *Continuum Modelling of Nanoscale Hydrodynamics*, Chapter 9 in Nanoscale Phenomena: Basic Science to Device Applications**,** Lecture Notes in Nanoscale Science and Technology, Volume 2 (Springer, New York, 2008).
7. Kwok, H.-S.; Xie, Z.-L.; <u>Qian, T.-Z.</u>; Sheng, P., *Study of switching behavior in bistable twisted nematic liquid crystal displays*, Proceedings of SPIE - The International Society for Optical Engineering. v. 3143, 1997, p. 22-30
8. Kwok, H.S.; <u>Qian, T.Z.</u>; Xie, Z.L.; Sheng, P., *Optical properties of bistable twisted nematic LCD and its switching mechanisms*, Conference record of the International Display Research Conference. 1997, p. 89-92

Professional Services

A. Teaching

Summer course "*Mathematical Introduction to Statistical Physics*" taught in the Summer School of Applied Mathematics and Scientific Computation in Peking University (2005, 2006, 2007, 2008, 2010, 2012)

B. Conferences Organized

- Workshop on Variational Approaches in Complex Systems, The South China Research Center for Applied Mathematics and Interdisciplinary Studies (CAMIS) at South China Normal University (April 12—14, 2019)
- Forum in Scientific Computing and Interdisciplinary Research, The South China Research Center for Applied Mathematics and Interdisciplinary Studies (CAMIS) at South China Normal University (November 15—17, 2018)
- The Hong Kong University of Science and Technology – Beijing Computational Science Research Center Joint Workshop on Computational Science, Hong Kong University of Science and Technology (January 13 and 14, 2017)
- Research program "*Nanoscale Interfacial Phenomena in Complex Fluids*", Kavli Institute for Theoretical Physics China of the Chinese Academy of Sciences (May 19—June 20, 2008)
- Workshop on "*Mathematics of Multi-Scale Problems*", The Hong Kong University of Science and Technology (December 9—13, 2007)
- Workshop on "*Multiscale Modeling: Complex Fluids and Microfluidics*", The Hong Kong University of Science and Technology (January 9—13, 2006)

C. Research Seminar Series Organized

- IAS Seminar Series on Soft Matter (Feb 2009—Jan 2010)