

Curriculum Vitae – WEIQING REN

ADDRESS

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EDUCATION

- Ph.D. September, 2002, Courant Institute, New York University
- B.S. June, 1994, Department of Mathematics, Nanjing University, China

ACADEMIC APPOINTMENTS

- Professor of Mathematics (2017 – present), Associate Professor (2011-2016), National University of Singapore
2011 – present, Senior Scientist (joint appointment), Institute of High Performance Computing, A*STAR, Singapore;
- 2005-2011, Assistant Professor of Mathematics, Courant Institute, New York University
2007-2011, Director of the Master Program in Scientific Computing, Courant Institute
- 2003-2005, Instructor, Department of Mathematics, Princeton University
- 2002-2003, Member, School of Mathematics, Institute for Advanced Study, Princeton

AWARDS

- Feng Kang Prize of Scientific Computing, 2015
- Alfred P. Sloan Research Fellowship, 2007

GRANTS

- MOE AcRF Tier-2 grant “Modeling and Simulation of Moving Contact Lines in Multi-phase Fluids” (S\$405,000), 2017-2020
- A*STAR SERC, “Complex system programme”, NUS lead (S\$666,000), 2012-2015
- A*STAR SERC, “Modeling and simulation of moving contact lines in complex fluids” (S\$262,800), PI, 2013-2016
- NSF DMS-1114827, “Numerical methods for the moving contact line problem”, PI
- NSF DMS-0806401, “Transition pathways and free energy calculations in complex systems”, PI
- NSF DMS-0604382, “Numerical methods for finding transition pathways in complex systems”, PI

GRADUATE STUDENTS AND POSTDOCS

- PhD students: Yunzhi Li (2012-2016), Jiancang Guo (2013-present), Hanwen Cui (2014 – present), Zhenqian E (2015-present), Guojiang Xi (2015 –present)
- Postdocs: Xu Yang (2010-2011, now Assistant Professor at UCSB), Yanan Zhang (2013-2014, now Assistant Professor at Soochow Univ.), Shixin Xu (2013-2015, now Research Fellow at the Univ. of Notre Dame), Zhen Zhang (2013-2015, now assistant Professor at the South Univ. of Science and Technology of China), Wenqi Yao (2014-present)

LIST OF PUBLICATIONS

1. S. Xu and W. Ren, "Re-initialization of the level set function in 3D simulation of moving contact lines", *Commun. Comput. Phys.*, 20 (2016): 1163-1182
2. Z. Zhang and W. Ren, "Simulation of moving contact lines in two-phase polymeric fluids", *Computers and Mathematics with Applications*, 72 (2016): 1002-1012
3. L. Zhang, W. Ren, A. Samanta and Q. Du, "Recent developments in computational modeling of nucleation in phase transformations", *npj Computational Materials*, 2 (2016): 16003
4. W. Yao and W. Ren, "Liquid-vapor transition on patterned solid surfaces in shear flow", *Journal of Chemical Physics*, 143 (2015): 244701
5. W. Yao and W. Ren, "Noise-induced transition in Barotropic flow over topography and application to Kuroshio". *Journal of Computational Physics*, 300 (2015): 352-364.
6. W. Ren, P. Trinh and W. E, "On the distinguished limit of the Navier slip model of the moving contact line problem". *Journal of Fluid Mechanics*, 772 (2015): 107-126.
7. Y. Zhang and W. Ren, "Numerical study of the effects of surface topography and chemistry on the wetting transition using the string method". *Journal of Chemical Physics*, 141 (2014): 244705.
8. Y. Li and W. Ren, "Numerical study of vapor condensation on patterned hydrophobic surfaces using the string method". *LANGMUIR*, 30 (2014): 9567-9576.
9. Z. Zhang, S. Xu and W. Ren, "Derivation of a continuum model and the energy law for moving contact lines with insoluble surfactants". *Physics of Fluids*, 26, no. 6 (2014): 062103.
10. J.-J. Xu and W. Ren, "A level set method for two-phase flows with moving contact lines and insoluble surfactants". *Journal of Computational Physics*, 263 (2014): 71-90.
11. W. Ren, "Wetting transition on patterned surfaces: transition states and energy barriers". *LANGMUIR*, 30, no. 10 (2014): 2879-2885.
12. W. Ren and E. Vanden-Eijnden, "A climbing string method for saddle point search". *Journal of Chemical Physics*, 138 (2013): 134105.
13. W. Ren and W. E, "Contact Line Dynamics on Heterogeneous Surfaces". *Physics of Fluids*, 23 (2011): 072103.
14. W. Ren and W. E, "Derivation of Continuum Models for the Moving Contact Line Problems based on Thermodynamic Principles". *Communications in Mathematical Sciences*, 9, no. 2 (2011): 597-606.

15. W. Ren, D. Hu and W. E, "Continuum Models for the Contact Line Problem". *Physics of Fluids*, 22 (2010): 102103.
16. C. Jin, W. Ren and Y. Xiang, "Computing Transition Rates of Thermally Activated Events in Dislocation Dynamics". *Scripta Materialia*, 62 (2010): 206-209.
17. H. C. Fogedby and W. Ren, "Minimum Action Method for the Kardar-Parisi-Zhang Equation". *Physical Review E*, 80 (2009): 041116.
18. W. E, W. Ren and E. Vanden-Eijnden, "A General Strategy for Designing Seamless Multiscale Methods". *Journal of Computational Physics*, 228, no. 15 (2009): 5437-5453.
19. C. Qiu, T. Qian and W. Ren, "Application of the String Method to the Study of Critical Nuclei in Capillary Condensation". *Journal of Chemical Physics*, 129 (2008): 154711.
20. C. Qiu, T. Qian and W. REN, "Phase Slips in Superconducting Wires with Nonuniform Cross Section: A Numerical Evaluation Using the String Method". *Physical Review B*, 77 (2008): 104516.
21. X. Zhou, W. Ren and W. E, "Adaptive Minimum Action Method for the Study of Rare Events". *Journal of Chemical Physics*, 128 (2008): 104111.
22. C. J. Garcia-Cervera, W. Ren, J. Lu and W. E, "Sequential Multiscale Modeling Using Sparse Representation". *Communications in Computational Physics*, 4 (2008): 1025-1033.
23. W. Ren, "Seamless Multiscale Modeling of Complex Fluids Using Fiber Bundle Dynamics". *Communications in Mathematical Sciences*, 5 (2007): 1027-1037.
24. W. Ren, "Analytical and Numerical Study of Coupled Atomistic-Continuum Methods for Fluids". *Journal of Computational Physics*, 227, no. 2 (2007): 1353-1371.
25. T. Qian, W. Ren, J. Shi, W. E and P. Sheng, "Numerical Study of Metastability due to Tunneling: The Quantum String Method". *Physica A: Statistical Mechanics and its Applications*, 379 (2007): 491-502.
26. W. E, W. Ren and E. Vanden-Eijnden, "Simplified and Improved String Method for Computing the Minimum Energy Paths in Barrier-Crossing Events". *Journal of Chemical Physics*, 126 (2007): 164103.
27. W. Ren and W. E, "Boundary Conditions for the Moving Contact Line Problem". *Physics of Fluids*, 19 (2007): 022101.
28. W. E, B. Engquist, X. Li, W. Ren and E. Vanden-Eijnden, "Heterogeneous Multiscale Methods: A review". *Communications in Computational Physics*, 2 (2007): 367.
29. W. Ren, E. Vanden-Eijnden, P. Maragakis and W. E, "Transition Pathways in Complex Systems: Application of the Finite Temperature String Method to the Alanine Dipeptide". *Journal of Chemical Physics*, 123 (2005): 134109.
30. W. E, W. Ren and E. Vanden-Eijnden, "Transition Pathways in Complex Systems: Reaction Coordinates, Isocommittor Surfaces, and Transition Tubes". *Chemical Physics Letters*, 413 (2005): 242-247.
31. T. Qian, W. Ren and P. Sheng, "Current Dissipation in Thin Superconducting Wires: Accurate Numerical Evaluation Using the String Method". *Physical Review B*, 72 (2005): 014512.

32. W. Ren and W. E, "Heterogeneous Multiscale Method for the Modeling of Complex Fluids and Micro Fluidics". *Journal of Computational Physics*, 204, no. 1 (2005): 1-26.
33. W. E, W. Ren and E. Vanden-Eijnden, "Finite-Temperature String Method for the Study of Rare Events". *The Journal of Physical Chemistry B*, 109, no. 14 (2005): 6688-6693.
34. W. E, W. Ren and E. Vanden-Eijnden, "Minimal Action Method for the Study of Rare Events". *Communications on Pure and Applied Mathematics*, 57, no. 5 (2004): 637-656.
35. J. Zhao, W. Wang and W. Ren, "Stability of the Matrix Factorization for Solving Block Tri-diagonal Symmetric Indefinite Linear Systems". *Bit Numerical Mathematics*, 44 (2004): 181.
36. W. Ren, "High Order Numerical Scheme in the String Method for Finding Minimum Energy Paths and Saddle Points". *Communications in Mathematical Sciences*, 1, no. 2 (2003): 377-384.
37. G. Fibich, W. Ren and X.-P. Wang, "Numerical Simulation of Self-focusing of Ultrafast Laser Pulse". *Physical Review E*, 67 (2003): 056603.
38. W. E, W. Ren and E. Vanden-Eijnden, "Energy Landscape and Thermally Activated Switching of Submicron-sized Ferromagnetic Elements". *Journal of Applied Physics*, 93, no. 4 (2003): 2275.
39. W. E, W. Ren and E. Vanden-Eijnden, "String Method for the Study of Rare Events". *Physical Review B*, 66 (2002): 052301.
40. W. Ren and X.-P. Wang, "A New Adaptive Grid Method Based on Iterative Grid Redistribution". *Methods and Applications of Analysis*, 8 (2001): 515.
41. W. Ren and X.-P. Wang, "An Iterative Grid Redistribution Method for Singular Problems in Multiple Dimensions". *Journal of Computational Physics*, 159, no. 2 (2000): 246-273.
42. W. Ren and J. Zhao, "Iterative Methods with Pre-conditioners for indefinite Systems". *Journal of Computational Mathematics*, 17 (1999): 89.

CONFERENCE ORGANIZED SINCE JOINING NUS

1. 3-month Program on "High Performance and Parallel Computing for Materials Defects and Multiphase Flows" at the Institute for Mathematical Sciences (IMS) of NUS, 01-03/2015, co-organizer.
2. The 9th International Conference on Computational Physics, Singapore, 01/2015, member of the organizing committee.
3. Mini-symposium "Rare Events: Modeling, Computation and Applications" at the 9th International Conference on Computational Physics, Singapore, 01/2015, co-organizer
4. Symposium "Mathematical Theory and Computational Techniques for Multiscale Materials Modeling" at the 7th International Conference on Multiscale Materials Modeling, USA, 10/2014, co-organizer.
5. Mini-symposium "Multiscale Methods and Applications in Computational Mechanics" at the 11th World Congress on Computational Mechanics, Spain, 07/2014, co-organizer.

6. Workshop on Modeling Rare Events in Complex Physical Systems at IMS of NUS, 11/2013, co-organizer.
7. Workshop on Nonlinear Partial Differential Equations: Analysis, Computation and Applications at IMS of NUS, 03/2012, co-organizer.

RECENT INVITED TALKS

1. Plenary talk at the 10th General Assembly of the China Society for Computational Mathematics, Guangzhou, China, 09/2015.
2. Mini-symposium “Rare Events in Complex Physical Systems” at the 8th International Congress on Industrial and Applied Mathematics, Beijing, China, 08/2015.
3. Workshop on Multiscale Modeling and Analysis in Materials Science, Shanghai, China, 08/2015.
4. Workshop on “Protein structure dynamics as rare event problem addressed with theoretical and/or experimental approaches” at the 15th Annual Meeting of the Protein Science Society of Japan, 06/2015.
5. Plenary lecture at the 9th International Conference on Computational Physics, Singapore, 01/2015.
6. Mini-symposium “Rare Events: Modeling, Computation and Applications” at the 9th International Conference on Computational Physics, Singapore, 01/2015.
7. Focused Program on “Multiscale Modeling and Simulation of Defect Problems in Materials Science” at the Institute for Advanced Study, the Hong Kong University of Science and Technology, 12/2014.
8. Workshop on Multiscale Simulation Methods for Soft Matter Systems, Mainz, Germany, 10/2014.
9. International Conference on “Mathematical Challenges to a New Phase of Materials Science” at the Research Institute for Mathematical Sciences, Kyoto University, Japan, 08/2014.
10. Workshop on “Mathematics in Action: Modeling and Analysis in Molecular Biology and Electrophysiology”, Soochow University, China, 06/2014.
11. Workshop on “Superhydrophobicity, Bubble Stability and Heterogeneous Nucleation”, University of Rome, Italy, 06/2014.
12. Minisymposium “Stochastic Evolution Equations and Exit Problems” at the SIAM conference on Uncertainty Quantification, Savannah, USA, 03/2014.
13. Annual Meeting on Numerical Porous Media at the King Abdullah University of Science and Technology, Saudi Arabia, 03/2014.
14. Conference on “Frontier of Soft Matter Physics: From Non-equilibrium Dynamics to Active Matter” at the Institute for Advanced Study, The Hong Kong University of Science and Technology, 01/2014.
15. Workshop on Rare Event Stochastic Computing and Application at the City University of Hong Kong, 01/2014.