

Shiying Xiong (熊诗颖)

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Current Position

Dartmouth College

Hanover, NH, USA

Postdoc in Computer Science, Advisor: Prof. Bo Zhu

10/2019 - Current

Education

Peking University

Beijing, China

Ph.D. in Fluid Mechanics, Advisor: Prof. Yue Yang

09/2014 - 07/2019

Jilin University

Changchun, China

B.S. in Physics

09/2010 - 07/2014

Research Interests

Vortex Dynamics, Computational Physics, Computer Graphics, and Scientific Machine Learning

Preprints

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1. S. Xiong, X. He, S. Yang, Z. Wang, Y. Tong, R. Tao, R. Liu, and B. Zhu. RoeNets: predicting discontinuity of hyperbolic systems from continuous data. *Journal of Computational Physics* (Under review)
 2. F. Feng, S. Xiong, Z. Liu, Z. Xian, Y. Zhou, H. Kobayashi, A. Kawamoto, T. Nomura, and B. Zhu. Cellular topology optimization on differentiable Voronoi diagrams. *Simulation Modelling Practice and Theory* (Under review)
 3. S. Xiong, X. He, Y. Tong, Y. Deng, and B. Zhu. Neural vortex method: from finite Lagrangian particles to infinite-dimensional Eulerian dynamics. *Computers and Fluids* (Under review)

Publications (Corresponding author *)

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1. S. Xiong, Z. Wang, M. Wang, and B. Zhu. A Clebsch method for free-surface vortical flow simulation. *ACM Transactions on Graphics*, 41, 116, 2022 (SIGGRAPH, **Featured on video trailer**)
 2. R. Tao, H. Ren, Y. Tong, and S. Xiong*. Construction and evolution of knotted vortex tubes in incompressible Schrödinger flow. *Physics of Fluids*, 33, 077112, 2021 (**Editor's pick**)
 3. S. Xiong, R. Tao, Y. Zhang, F. Feng, and B. Zhu. Incompressible flow simulation on vortex segment clouds. *ACM Transactions on Graphics*, 40, 98, 2021 (SIGGRAPH, **Featured on video trailer**)
 4. S. Yang, S. Xiong*, Y. Zhang, F. Feng, J. Liu, and B. Zhu. Clebsch gauge fluid. *ACM Transactions on Graphics*, 40, 99, 2021 (SIGGRAPH)
 5. Y. Tong, S. Xiong*, X. He, G. Pan, and B. Zhu. Symplectic neural networks in Taylor series form for Hamiltonian systems. *Journal of Computational Physics*, 437, 110325, 2021
 6. S. Xiong*, Y. Tong, X. He, S. Yang, C. Yang, and B. Zhu. Nonseparable symplectic neural networks. *International Conference on Learning Representations*, 2021 (ICLR)
 7. S. Xiong and Y. Yang*. Effects of twist on the evolution of knotted magnetic flux tubes. *Journal of Fluid Mechanics*, 895, A28, 2020
 8. S. Xiong and Y. Yang*. Identifying the tangle of twisted vortex tubes in homogeneous isotropic turbulence.

Journal of Fluid Mechanics, 874, 952-978, 2019 (**Featured on cover**)

9. **S. Xiong** and Y. Yang*. Construction of knotted vortex tubes with the writhe-dependent helicity. *Physics of Fluids*, 31, 047101, 2019 (**Editor's pick**)
10. **S. Xiong** and Y. Yang*. The boundary-constraint method for constructing vortex-surface fields. *Journal of Computational Physics*, 339, 31-45, 2017
11. Y. Deng, M. Wang, X. Kong, **S. Xiong**, and B. Zhu. A moving Eulerian-Lagrangian particle method for thin film and foam simulation. *ACM Transactions on Graphics*, 41, 154, 2022 (SIGGRAPH)
12. S. Ruan, **S. Xiong**, and J. You, and Yue Yang*. Generation of streamwise helical vortex loops via successive reconnections in early pipe transition. *Physics of Fluids*, 34, 054112, 2022
13. F. Feng, J. Liu, **S. Xiong**, S. Yang, Y. Zhang, and B. Zhu. Impulse fluid simulation. *IEEE Transactions on Visualization and Computer Graphics*, DOI: 10.1109/TVCG.2022.3149466
14. M. Wang, Y. Deng, X. Kong, A. Prasad, **S. Xiong**, and B. Zhu. Thin-film smoothed particle hydrodynamics fluid. *ACM Transactions on Graphics*, 40, 110, 2021 (SIGGRAPH, **Featured on video trailer**)
15. D. DiPietro, **S. Xiong**, and B. Zhu. Sparse symplectically integrated neural networks. *Advances in Neural Information Processing Systems*, 33, 2020 (NeurIPS)
16. **S. Xiong** and Y. Yang*. Evolution and helicity analysis of linked vortex tubes in viscous flows. *SCIENTIA SINICA Physica, Mechanica & Astronomica*, 50, 040005, 2020 (In Chinese)
17. J. Hao, **S. Xiong**, and Y. Yang*. Tracking vortex surfaces frozen in the virtual velocity in non-ideal flows. *Journal of Fluid Mechanics*, 863, 513-544, 2019
18. H. Zhou, J. You, **S. Xiong**, Y. Yang*, D. Thévenin, and S. Chen. Interactions between the premixed flame front and the three-dimensional Taylor-Green vortex. *Proceedings of the Combustion Institute*, 37, 2461-2468, 2019
19. Y. Zhao, **S. Xiong**, Y. Yang*, and S. Chen. Sinuous distortion of vortex surfaces in the lateral growth of turbulent spots. *Physical Review Fluids*, 3, 074701, 2018

Conference Presentations

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1. A Clebsch method for free-surface vortical flow simulation. *Special Interest Group for Computer Graphics* (SIGGRAPH, Virtual), Aug. 2022
 2. A Clebsch method for free-surface vortical flow simulation. *Center on Frontiers of Computing Studies, Peking University* (Virtual), Jul. 2022
 3. A Clebsch method for free-surface vortical flow simulation. *Dartmouth Innovation and Technology Festival* (Poster), May 2022
 4. Incompressible fluid simulation based on vortex surface field. *212th Graphics and Mixed Environment Seminar* (Games Webinar, Virtual, **Invited Speaker**), Dec. 2021
 5. Incompressible flow simulation on vortex segment clouds. *Special Interest Group for Computer Graphics* (SIGGRAPH, Virtual), Aug. 2021
 6. Nonseparable symplectic neural networks. *9th International Conference on Learning Representations* (ICLR, Virtual), May 2021
 7. Identifying the tangle of twisted vortex tubes in homogeneous isotropic turbulence. *71st Annual Meeting of the APS Division of Fluid Dynamics*, Nov. 2018, Atlanta, USA
 8. Spiral vortex structures in homogeneous isotropic turbulence. *10th National Congress on Fluid Mechanics of China*, Oct. 2018, Hangzhou, China
 9. Identifying the spiral vortex tubes and tracking vortex surfaces frozen in the virtual velocity. *Chiral and Structure Seminar at Su-Cheng Center*, Oct. 2018, Nanjing, China
 10. Construction of vortex-surface fields in isotropic turbulence. *Chinese Congress of Theoretical and Applied*

Mechanics, Aug. 2017, Beijing, China

11. Characterization of representative vortex surfaces in K-type transitional boundary layer. *10th International Symposium on Turbulence and Shear Flow Phenomena*, Jul. 2017, Chicago, USA
12. The boundary-constraint method for constructing vortex-surface fields. *69th Annual Meeting of the APS Division of Fluid Dynamics*, Nov. 2016, Portland, USA
13. Construction of Vortex-surface fields based on boundary constraint, *9th National Congress on Fluid Mechanics of China*, Oct. 2016, Nanjing, China

Mentoring (with Prof. Bo Zhu)

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- Daniel M. DiPietro (Undergraduate at Dartmouth College)
2021 Neukom Undergraduate Research Prize Winner, CRA Outstanding Undergraduate Researcher Finalist
 - Yunjin Tong (Undergraduate at Dartmouth College)
2021 Francis L. Town Scientific Prize, 2022 CRA Outstanding Undergraduate Researcher Honorable Mention
 - Shuqi Yang (Master at Dartmouth College)
2021 Neukom Graduate Research Prize Winner
 - Zhecheng Wang (Visiting undergraduate at Dartmouth College)
 - Rui Tao (Visiting Ph.D. Student at Dartmouth College)

Teaching

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- Spring 2022, Teaching, *Differential Geometry*, Seminar Talk, Dartmouth College
 - Spring 2018, 2016, Teaching Assistant, *Engineering Mathematics*, Yuanpei College, Peking University
 - Spring 2017, Teaching Assistant, *Calculus II*, College of Engineering, Peking University

Service

The referee for *Journal of Computational Physics*, *Physics of Fluids*, *Fluids*, *Micromachines*, *International Conference on Learning Representations*, *International Conference on Machine Learning*, *Conference on Neural Information Processing Systems*