

# Szu-Pei P. Fu

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## CONTACT INFORMATION

Trinity College  
Mathematics Department  
300 Summit Street  
Hartford, CT 06106

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## RESEARCH INTERESTS

Brownian Dynamics Simulations, Polymer and Cell Biology, Numerical Analysis, Integral Equation Methods, and Fast Algorithms for Partial Differential Equations, Financial Mathematics.

## EMPLOYMENT

- **Department of Mathematics, Trinity College**
  - Harold L. Dorwart Visiting Assistant Professor, July 2022–Present.
- **Department of Mathematics, Fordham University**
  - Peter M. Curran Visiting Assistant Professor, September 2017–July 2022.

## EDUCATION

- **Department of Mathematical Sciences, New Jersey Institute of Technology (NJIT)**
  - Ph.D., Applied Mathematics Track in Mathematical Sciences, August 2017.
    - \* Dissertation Topic: Efficient Brownian Dynamic Simulations for Coarse-Grained DNA Molecules and Lipid Bilayer Membranes.
    - \* Advisors: **Professor Yuan-Nan Young and Professor Shidong Jiang.**
  - M.S. in Mathematical and Computational Finance (**GPA 3.75**), December 2010.
    - \* Graduate Project: Use 10-year Historical Gold Prices to Find EWMA, GARCH(1,1) Parameters and Forecast the Implied Volatility of Gold Price of 2010.
    - \* Project Supervisor: **Professor Karen Rappaport.**
- **Department of Financial Engineering and Actuarial Mathematics, Soochow University, Taipei, Taiwan**
  - Bachelor of Business Administration (**GPA 3.45**), June 2006.

## PUBLICATIONS

1. S.-P. Fu, Y.-N. Young and S. Jiang, *Efficient Brownian dynamics simulation of DNA molecules with hydrodynamic interactions in linear flows*, Phys. Rev. E, 91, 063008, 2015.
2. S.-P. Fu, Z. Peng, R. Kfoury, H. Yuan and Y.-N. Young, *Lennard-Jones type pair-potential method for coarse-grained lipid bilayer membrane simulations in LAMMPS*, Comput. Phys. Commun., 210C, 193–203, 2017.
3. S.-P. Fu, R. Ryham, A. Klöckner, M. Wala, S. Jiang and Y.-N. Young, *Simulation of multiscale hydrophobic lipid dynamics via efficient integral equation methods*, Multiscale Model. Simul., 18(1), 79–103, 2020.
4. S.-P. Fu, B. Quaife, R. Ryham and Y.-N. Young, *Two-Dimensional Vesicle Hydrodynamics from Hydrophobic Attraction Potential*, J. Fluid Mech., 941, A41, 2022.
5. S.-P. Fu, R. Ryham, B. Quaife, and Y.-N. Young, *Effects of Tunable Hydrophobicity on the Collective Hydrodynamics of Janus Particles under Flows*, **submitted**, 2022.

CONFERENCE  
PRESENTATIONS

1. *A Fast Multipole Method and a Metropolis Method for Coarse-grained Brownian Dynamics Simulations of a DNA with Hydrodynamic Interactions*, 67th Annual Meeting of the APS–DFD (San Francisco, Nov 2014).
2. *Efficient Brownian dynamics simulation of DNA molecules with hydrodynamic interactions in linear flows*, The 5th Northeast Complex Fluids and Soft Matter Workshop (NCS5) (NYU Tandon School of Engineering, Jan 2016).
3. *An Accurate Metropolis-Hastings Algorithm and a Fast Multipole Method for Coarse-Grained Lipid Bilayer Membrane in Solvent*, The 2016 SIAM Conference on Mathematical Aspects of Materials Science (MS16) (Philadelphia, May 2016).
4. *Brownian dynamics simulations of lipid bilayer membrane with hydrodynamic interactions in LAMMPS*, The 2016 SIAM Annual Meeting (AN16) (Boston, Jul 2016).
5. *Brownian dynamics simulations of lipid bilayer membrane with hydrodynamic interactions in LAMMPS*, 69th Annual Meeting of the APS–DFD (San Francisco, CA, Nov 2016).
6. *Brownian dynamics simulations of lipid bilayer membrane with hydrodynamic interactions in LAMMPS*, APS March Meeting 2017 (New Orleans, LA, Mar 2017).
7. *Wetting and Adhesion mediated by Nanoscale Capillary Bridges*, 70th Annual Meeting of the APS–DFD (Denver, CO, Nov 2017).
8. *Variational approach of coarse-grained lipid dynamics based on potential for amphiphilic molecules*, The 13th World Congress in Computational Mechanics (WCCMXIII) (New York, NY, Jul 2018).
9. *Self-assembly and Hydrodynamics of Coarse-Grained Amphiphilic Lipids*, 71st Annual Meeting of the APS–DFD (Atlanta, GA, Nov 2018).
10. *Formation of vesicles in a viscous solvent: A hybrid coarse-grain/continuum approach*, 72nd Annual Meeting of the APS–DFD (Seattle, WA, Nov 2019).
11. *Simulation of Multiscale Hydrophobic Lipid Dynamics via Efficient Integral Equation Methods*, The Second Joint SIAM/CAIMS Annual Meeting (AN20) (Virtual Conference, Jul 2020).
12. *Hydrodynamics of small unilamellar vesicles (sUVs) simulated using a hybrid approach*, 73rd Annual Meeting of the APS–DFD (Virtual Conference, Nov 2020).
13. *Hydrodynamics of Janus particles self-assembled as vesicles*, 74th Annual Meeting of the APS–DFD (Phoenix, AZ, Nov 2021).
14. *Hydrodynamics of Janus particles self-assembled as vesicles*, Northeast Complex Fluids and Soft Matter (NCS) Workshops (Virtual, Jan 2022).
15. NSF-funded conference on Models for uncovering rules and unexpected phenomena in biological systems (MODULUS) (Fairfax, VA, Aug 2022).
16. *Collective behavior of Janus Particles Suspended in a Viscous Fluid*, 75th Annual Meeting of the APS–DFD (Indianapolis, IN, Nov 2022).

CONFERENCE  
POSTERS

1. *Frontiers in Applied and Computational Mathematics (FACM) Poster Session* (NJIT, May 2014, Jun 2016).
2. *An Integral Equation Method Coupling with Variational Approach for Studying Coarse-Grained Lipid Dynamics*, 70th Annual Meeting of the APS–DFD Poster Session (Denver, CO, Nov 2017).
3. *Hydrodynamics of Janus particles self-assembled as vesicles*, 9th World Congress of Biomechanics 2022 Taipei (Taipei, Taiwan, Jul 2022).

## WORKSHOPS

1. *New Perspectives in Markov Chain Monte Carlo*, University of Valladolid, Valladolid, Spain, Jun 2015.
2. *HKUST-ICERM Integral Equation Methods, Fast Algorithms and Their Applications to Fluid Dynamics and Materials Science*, HKUST, Hong Kong, Jan 2017.
3. *HKUST-ICERM Integral Equation Methods, Fast Algorithms and Their Applications to Fluid Dynamics and Materials Science*, Brown University, Providence, RI, May 2017.

## TEACHING EXPERIENCE

- TRINITY COLLEGE – INSTRUCTOR:
  - Statistical Data Analysis (MATH-207), Fall 2022.
  - Calculus III (MATH-231), Fall 2022.
  - Intro to Math Modeling I (MATH-252), Spring 2023.
  - Differential Equations (MATH-234), Spring 2023.
  - Partial Differential Equations (MATH-334), Spring 2023.
- FORDHAM UNIVERSITY – INSTRUCTOR:
  - Calculus I (MATH-1206), Summer 2018, Fall 2018, Spring 2022 (two sections), Summer 2022.
  - Calculus II (MATH-1207), Fall 2017 (two sections), Spring 2018, Fall 2021 (two sections).
  - Mathematical Modeling (MATH-1700), Spring 2019.
  - Discrete Mathematics (MATH-2001), Fall 2017, Summer 2019, Summer 2021.
  - Multivariable Calculus I (MATH-2004), Fall 2019, Spring 2020, Spring 2021.
  - Linear Algebra I (MATH-2006), Fall 2019, Fall 2020, Fall 2021.
  - Differential Equations (MATH-3002), Spring 2020, Spring 2021.
  - Numerical Analysis (MATH-4006), Fall 2018, Fall 2019, Fall 2020.
  - Independent Study–Finite Difference Methods, Fall 2020.
  - Independent Study–Introduction of Financial Mathematics, Spring 2019.
- NJIT – TEACHING RESERVE:
  - Served as a reserve for emergency instructor substitution for mathematical sciences department, Fall 2013 ~ Spring 2015 and Fall 2016, NJIT.
- NJIT – MATLAB TUTOR:
  - Undergraduate Matlab Tutoring, Spring 2013, NJIT.
- NJIT – TEACHING ASSISTANT:
  - Calculus I,II, Calculus I, II (honor school sections), Fall 2011, Spring 2012, Fall 2015 and Spring 2016, NJIT.

## SERVICE AND CONTRIBUTIONS

1. Served as the administrator of the Fordham WebWork Server and managed the online course assignments for undergraduate level courses.
2. Served as the administrator of the Fordham computing package – Sage server.
3. Served as a technical assistant of the Fordham Math Placement Exam.
4. Served as the club advisor of the Fordham Actuarial Club.
5. Served as the advisor of undergraduate students.
6. Served as a dissertation committee of one master student in Computer and Information Sciences graduate program (Jason Hughes, MS in Data Science, Fordham University, Aug 2021).

HONORS AND  
AWARDS

- NJIT Ahluwalia Doctoral Fellowship, U.S. \$1,000, Spring, 2017.
- NJIT Graduate Student Association Travel Award for attending conferences, U.S. \$600, Spring 2015.
- Travel subsidy grant of the Division of Fluid Dynamics (DFD) of the American Physical Society (APS), 2014 Annual Meeting, U.S. \$500.
- Awardee of East Asia and Pacific Summer Institutes (EAPSI) Program, National Science Foundation, stipend of U.S. \$5,070, Summer 2014. (Mentor: Dr. Ming-Chih Lai, NCTU)
- 3-time Certification of Presidential Award  
Soochow University (Granted separately in: Nov 2005, Mar 2005, Mar 2004)  
(Average academic record of semester was ranked the 1st in the class.)

RELEVANT  
SKILLS

- Computer Languages: Matlab, C++, fortran, python.
- Tools: LaTeX, Microsoft Office, LAMMPS, VMD.

REFERENCES

- **Yuan-Nan Young**, Professor of Mathematical Sciences, New Jersey Institute of Technology, (973)-596-7034, [yyoung@njit.edu](mailto:yyoung@njit.edu)
- **Shidong Jiang**, Professor of Mathematical Sciences, New Jersey Institute of Technology, (973)-596-3141, [shidong.jiang@njit.edu](mailto:shidong.jiang@njit.edu)
- **Zhangli Peng**, Assistant Professor of Bioengineering, University of Illinois at Chicago, (312) 996-7467, [zhpeng@uic.edu](mailto:zhpeng@uic.edu)
- **Rolf J. Ryham**, Associate Professor of Mathematics, Fordham University, (718) 817-5292, [rryham@fordham.edu](mailto:rryham@fordham.edu)
- **Bryan Quaife**, Associate Professor of Scientific Computing, Florida State University, (850) 644-6560, [bquaife@fsu.edu](mailto:bquaife@fsu.edu)
- **Kirsti A. Kuenzel**, Assistant Professor of Mathematics, Trinity College, (860) 297-2577, [kirsti.kuenzel@trincoll.edu](mailto:kirsti.kuenzel@trincoll.edu)
- **Lina Ma**, Assistant Professor of Mathematics, Trinity College, (860) 297-2289, [lina.ma@trincoll.edu](mailto:lina.ma@trincoll.edu)

LANGUAGE

- Mandarin Chinese (native), Taiwanese (native).
- English (fluent).

MILITARY SERVICE

- Taiwan Mandatory Military Service Oct 2006–Dec 2007.