# Jiajun Tong

5 Yiheyuan Rd BICMR, Peking University Beijing 100871, China tongj@bicmr.pku.edu.cn bicmr.pku.edu.cn/'tongj

Updated on June 27, 2025

### Academic Positions

- Sept. 2021 Assistant Professor, Beijing International Center for Mathematical Research (BICMR), Peking University, China
- July 2018 Hedrick Assistant Adjunct Professor, University of California, Los Angeles, USA
- June 2021 O Mentor: Prof. Inwon C. Kim

### Education

- Sept. 2013 Ph.D. in Mathematics, Courant Institute, New York University, USA
- May 2018 🛛 Advisor: Prof. Fang-Hua Lin
  - $_{\odot}\,$  Thesis: On the Stokes Immersed Boundary Problem in Two Dimensions
- Sept. 2009 B.S. in Applied and Computational Mathematics, Peking University, China
  - July 2013 O Advisor: Prof. Pingwen Zhang
    - $_{\odot}\,$  Thesis: Mean-Field Simulations of Quasicrystalline Phases in ABC Star Block Terpolymer Systems

## **Research Interests**

Partial differential equations and applied analysis, especially evolution free boundary problems, PDEs in fluid dynamics, and calculus of variations.

# Publications

- [1] De Huang and Jiajun Tong. Steady contiguous vortex-patch dipole solutions of the 2D incompressible Euler equation. *arXiv preprint arXiv:2406.09849*, 2024. *Accepted by Archive for Rational Mechanics and Analysis*.
- [2] Jiajun Tong and Yuming Paul Zhang. Convergence of free boundaries in the incompressible limit of tumor growth models. *Journal de Mathématiques Pures et Appliquées*, 203:103752, 2025.
- [3] Jiajun Tong and Dongyi Wei. Geometric properties of the 2-D Peskin problem. *Annals of PDE*, 10(24), 2024.
- [4] De Huang, Jiajun Tong, and Dongyi Wei. On self-similar finite-time blowups of the De Gregorio model on the real line. *Communications in Mathematical Physics*, 402:2791–2829, 2023.
- [5] Jiajun Tong. Global solutions to the tangential Peskin problem in 2-D. *Nonlinearity*, 37(1):015006, 2024.
- [6] Matt Jacobs, Inwon Kim, and Jiajun Tong. Tumor growth with nutrients: Regularity and stability. *Communications of the American Mathematical Society*, 3:166–208, 2023.
- [7] Matt Jacobs, Inwon Kim, and Jiajun Tong. Darcy's law with a source term. *Archive for Rational Mechanics and Analysis*, 239(3):1349–1393, 2021.

- [8] Matt Jacobs, Inwon Kim, and Jiajun Tong. The *L*<sup>1</sup>-contraction principle in optimal transport. *The Annali della Scuola Normale Superiore di Pisa, Classe di Scienze,* XXIII:1871–1919, 2022.
- [9] Inwon Kim and Jiajun Tong. Interface dynamics in a two-phase tumor growth model. *Interfaces and Free Boundaries*, 23(2):191–304, 2021.
- [10] Zhiyuan Geng and Jiajun Tong. Regularity of minimizers of a tensor-valued variational obstacle problem in three dimensions. *Calculus of Variations and Partial Differential Equations*, 59, 57, 2020.
- [11] Jiajun Tong. Regularized Stokes immersed boundary problems in two dimensions: Wellposedness, singular limit, and error estimates. *Communications on Pure and Applied Mathematics*, 74(2):366–449, 2021.
- [12] Jiajun Tong and Michael J. Shelley. Directed migration of microscale swimmers by an array of shaped obstacles: modeling and shape optimization. *SIAM Journal on Applied Mathematics*, 78(5):2370–2392, 2018.
- [13] Zaihui Gan, Fang-Hua Lin, and Jiajun Tong. On the viscous Camassa-Holm equations with fractional diffusion. *Discrete & Continuous Dynamical Systems A*, 40(6):3427–3450, 2020.
- [14] Fang-Hua Lin and Jiajun Tong. Solvability of the Stokes immersed boundary problem in two dimensions. *Communications on Pure and Applied Mathematics*, 72(1):159–226, 2019.
- [15] Megan S. Davies Wykes, Xiao Zhong, Jiajun Tong, Takuji Adachi, Yanpeng Liu, Leif Ristroph, Michael D. Ward, Michael J. Shelley, and Jun Zhang. Guiding microscale swimmers using teardrop-shaped posts. *Soft Matter*, 13:4681–4688, 2017.
- [16] Kai Jiang, Jiajun Tong, and Pingwen Zhang. Stability of soft quasicrystals in a coupled-mode Swift-Hohenberg model for three-component systems. *Communications in Computational Physics*, 19(3):559–581, 2016.
- [17] Kai Jiang, Jiajun Tong, Pingwen Zhang, and An-Chang Shi. Stability of two-dimensional soft quasicrystals in systems with two length scales. *Physical Review E*, 92(4):042159, 2015.

#### Grants

National Key R&D Program of China, No. 2021YFA1001500, Principal Investigator, Dec. 2021 - Nov. 2026

### Honors and Awards

2023 Peking University Boya Young Fellow, PKU

- Apr. 2019 Best Poster Award, Southern California Applied Mathematics Symposium (SOCAMS 2019)
- 2017 2018 Dean's Dissertation Fellowship, Graduate School of Arts and Science, NYU
- 2013 2017 Henry M. MacCracken Fellowship, Graduate School of Arts and Science, NYU
- July 2013 Outstanding Graduate in Beijing
- Aug. 2012 Gold Medalist in Team Contest, and Silver Medalist in Individual Contest of Applied and Computational Mathematics, S.-T. Yau College Student Mathematics Contests

	Seminars and Conferences Organized
Lune coor	A dura era in Mathematical Elui d Demanica, Dalvina Universita
June 2025	Advances in Mathematical Fluid Dynamics, Peking University
Dec. 2023	Recent Advances in Fluid Dynamics: Singularity, Regularity and Mixing, Duke Kunshan University
Sep. 2021 –	PDE/Analysis Seminar, BICMR
	Research Talks
	Mestaletar Methandial El id Denania Wethale University
May 2025	7th Workshop on Mathematical Fluid Dynamics, Westlake University
May 2025	International Conference on Partial Differential Equations, NYU Shanghai
May 2025	PDE Seminar, Seoul National University
Feb. 2025	Analysis Seminar (online), Academia Sinica
Jan. 2025	Seminar, The Hong Kong Polytechnic University
Jan. 2025	Departmental Colloquia, City University of Hong Kong
Jan. 2025	Mathematics Seminar Series, Great Bay University
Jan. 2025	Workshop on Nonlinear Analysis, Beijing Normal University at Zhuhai
Dec. 2024	PDE Seminar, Beijing Normal University
Nov. 2024	Workshop on Mixing, Enhanced Dissipation and Stability Effects in Fluid Dynamics, Tianyuan Mathematics Research Center
Nov. 2024	PDE Seminar, Zhejiang Normal University
Oct. 2024	Analysis and PDE Seminar, Peking University
Aug. 2024	Analysis and PDE Seminar, Zhejiang University
Apr. 2024	PDE Seminar, Fudan University
Apr. 2024	Conference on Analysis in Fluids, Kinetic Theory, and Waves, Fuzhou University
Mar. 2024	Miniworshop on Partial Differential Equations, Capital Normal University
Nov. 2023	Online Workshop on PDEs in Applications (online), Fudan University
Nov. 2023	Workshop on Advances in PDEs, Beihang University
Nov. 2023	2nd Workshops on Mathematical Fluid Dynamics, Westlake University
Oct. 2023	PDE Seminar, Shanghai Jiao Tong University
June 2023	PDE Seminar, Morningside Center of Mathematics, Chinese Academy of Sciences
May 2023	PDE Seminar Series, NYU-ECNU Institute of Mathematical Sciences at NYU Shanghai
Oct. 2022	New Trends in Mathematical Biology (online), Duke Kunshan University
Oct. 2022	Workshop on Analysis and PDEs (online), Shanghai Jiao Tong University
June 2022	Analysis Research Interaction Team Seminar, Beijing International Center for Mathematical Research, Peking University
Dec. 2021	PDE Seminar (online), University of Electronic Science and Technology of China
Dec. 2021	PDE Seminar, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
Dec. 2021	Workshop on Nonlinear PDE Theory and Applications (online), Capital Normal University
Oct. 2021	Hua Loo-Keng Youth Lecture in Mathematics, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
May 2021	Seminar (online), Zhejiang University

- Dec. 2020 Vinter Young Mathematician Forum at Shanghai Jiao Tong University (online)
- Dec. 2020 Seminar (online), Fudan University
- Nov. 2020 Seminar (online), National University of Singapore
- Nov. 2020 PDE/Analysis Seminar (online), Beijing International Center for Mathematical Research, Peking University
- Oct. 2020 Analysis of Fluids and Related Topics Seminar (online), Princeton University
- Sep. 2020 PDE Seminar (online), Purdue University
- Sep. 2020 Young Mathematician Lecture Series (online), National University of Singapore
- Feb. 2020 Analysis and PDE Seminar, UCLA
- Dec. 2019 SIAM Conference on Analysis of Partial Differential Equations (PD19)
- Nov. 2019 Participating Analysis Seminar, UCLA
- May 2019 Applied and Computational Mathematics Seminar, University of Wisconsin Madison
- Feb. 2018 Applied Mathematics Colloquium, Columbia University
- Jan. 2018 Geometry & Analysis Seminar, Columbia University
- Jan. 2018 Participating Analysis Seminar, UCLA
- Nov. 2017 PDE Seminar, NYU-ECNU Institute of Mathematical Sciences at NYU Shanghai
- Oct. 2017 PDE Seminar, Zhejiang University
- Oct. 2017 Fall Program on Analysis of PDE (Week 6), Shanghai Center for Mathematical Sciences, Fudan University
- Nov. 2016 69th Annual Meeting of the APS Division of Fluid Dynamics

#### Teaching

#### PKU

Fall 2025 Mathematical Analysis (I) Spring 2025 Advanced Mathematics A (II), and 3+X Undergraduate Seminar (joint with De Huang) Fall 2024 Advanced Mathematics A (I) Spring 2024 Mathematical Analysis (II) Fall 2023 Mathematical Analysis (III), and 3+X Undergraduate Seminar (joint with De Huang) Spring 2023 Topics in Analysis and PDE: Free Boundary Problems Fall 2022 Advanced Mathematics A (I) Spring 2022 Advanced Mathematics A (II) UCLA Spring 2021 Math 131A Analysis (Lec 1), and Math 135 Ordinary Differential Equations (Lec 2) Winter 2021 Math 134 Linear and Nonlinear Systems of Differential Equations (Lec 1) Fall 2020 Math 135 Ordinary Differential Equations (Lec 3) Spring 2020 Math 136 Partial Differential Equations (Lec 1) Winter 2020 Math 151A Applied Numerical Methods (Lec 1 & 2) Fall 2019 Math 151A Applied Numerical Methods (Lec 1) Spring 2019 Math 151A Applied Numerical Methods (Lec 1) Winter 2019 Math 132H Complex Analysis (Honors) (Lec 1)

#### Fall 2018 Math 151A Applied Numerical Methods (Lec 1 & 2)

# Mentoring

PKU Undergraduate students
Siyu Chen (since Spring 2025)
Hao Chen (since Spring 2025)
Yicheng Dong (since Spring 2025)
Zanlin Yang (since Spring 2025)
Xiaopeng Zheng (since Spring 2024)
Zirui Wang (since Fall 2023)
Haoran Liu (Fall 2023 – Spring 2025, The Muskat Problem)
Jiehui Zhai (Fall 2023 – Spring 2024, Mathematical Theory of Mean-Field Games)
Yao Liu (Spring 2022 – Spring 2024, Fluid-Structure Interaction Problems)
UCLA Undergraduate students
Mingxin Li (Winter 2021, Real Analysis; Spring 2021, Numerical Analysis of Free Boundary Problems in Fluid Dynamics)

Jiayun Meng (Spring 2020, Real Analysis; Summer 2020, Complex Analysis and Functional Analysis; Spring 2021, Free Boundary Problems in Fluid Dynamics)

Xu Tang (Spring 2019, Basics of Monte Carlo Method)