

Xinyu Cheng

Ph.D. in Mathematics

PERSONAL DETAILS

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Mail xycheng@fudan.edu.cn
Webpage <https://sanyutsing.github.io/>

EDUCATION

Doctor of Philosophy in Mathematics <i>University of British Columbia</i> Area: Analysis, dynamics and numerics in PDEs PhD Thesis: Analytical and numerical results for phase field, implicit free boundary, and fluid models. Advisers: Prof. Li, Dong & Prof. Wetton, Brian	2021.11
Masters of Science in Mathematics <i>University of British Columbia</i> Area: Analysis, dynamics and numerics in PDEs MSc Thesis: On the Stability of a Semi-Implicit Scheme of Cahn-Hilliard Type Equations. Advisers: Prof. Li, Dong & Prof. Wetton, Brian	2017.09
Bachelor of Science in Mathematics <i>The Chinese University of Hong Kong</i> Areas: Computational & Applied Maths; Enrichment Stream in Maths.	2015.11

WORKING EXPERIENCE

Young Principal Investigator <i>Research Institute of Intelligent Complex Systems at Fudan University</i>	2023.12-present
Postdoc Fellow <i>the School of Mathematical Sciences at Fudan University</i> Host: Prof. Lei, Zhen.	2021.09-2023.11
Full-time Instructor <i>Department of Mathematics, University of British Columbia</i> Math 110/001: Differential Calculus	2018.09-2019.01 2018-2019 Winter term 1
Full-time Teaching Assistant <i>Department of Mathematics, University of British Columbia</i>	2015.09-2021.11

GRANTS

ACTIVE

NSFC, Young Scientists Fund (**30W**) 2025.01-

Shanghai Magnolia Talent Plan Pujiang Project (30W)	2024.12-
Natural Science Foundation of Shanghai, General Projects (20W)	2024.10-
NSFC, Original Exploration Program (130W , participate)	2025.01-
Completed	
China Postdoctoral Science Special Fund, In-Station (18W)	2022.10-2023.11
China Postdoctoral Science Fund, General Projects (8W)	2022.10-2023.11
International Postdoctoral Exchange Fellowship (40W)	2021.09-2023.11
Shanghai “Super Postdoc” Incentive Plan (20W)	2021.09-2023.11

HONORS & AWARDS

the University of British Columbia

President’s Academic Excellence Initiative PhD Award	2020,2021
International Doctoral Fellowship	2017-2021
International Doctoral Fellowship Tuition Award	2017-2021
International Tuition Award	2015-2017
Faculty of Science Graduate Award	2015-2017

the Chinese University of Hong Kong

First Class Graduate Honor	2015
Morningside College Master’s List	2014-2015
Science Faculty Dean’s List	2014-2015
Morningside College Exchange Scholarship	2013
Wei Lun Exchange Scholarships	2013
Weishan Lake Academic Scholarship	2012,2013

RELEVANT SKILLS

Software:	LATEX, MATHEMATICA, MS OFFICE, VISUAL STUDIO
Programming:	C++, C, MATLAB

PUBLICATIONS

Published and Accepted

1. *On the Spectral Gap of a Square Distance Matrix*, joint with D. Li, D. Shirokoff and B. Wetton, J Stat Phys, 2017, 166(3-4), 1029–1035.
2. *Asymptotic Behaviour of Time Stepping Methods for Phase Field Models*, joint with D. Li, K. Promislow and B. Wetton, J Sci Comput, 2021, 86(3), 1–34.
3. *On a parabolic Sine-Gordon model*, joint with D. Li, C. Quan and W. Yang, Numerical Mathematics: Theory, Methods and Applications, 2021, 14(4), 1068–1084.
4. *Non-uniqueness of stationary weak solutions to the surface quasi-geostrophic equations*, joint with H. Kwon and D. Li, 2021, Commun. Math. Phys. 388, 1281–1295.
5. *Global wellposedness for 2D quasilinear wave without Lorentz*, joint with D. Li, J. Xu and D. Zha, Dynam. Part. Differ. Eq., 2022, 19(2) , 123-140.

6. *On the equivalence of classical Helmholtz equation and fractional Helmholtz equation with arbitrary order*, joint with D. Li and W. Yang , to appear in Comm. Contemp. Math.
7. *Equivalent formulations of the oxygen diffusion problem and other implicit free boundary value problems and implications for numerical approximation*, joint with Z. Fu and B. Wetton, Siam J. Appl. Math., 2023, 83(1), 52-78.
8. *On the global well-posedness and scattering of the 3D Klein-Gordon-Zakharov system*, joint with J. Xu, Calc. Var. Part. Diff. Eqn., 63(17), 2024.
9. *Localization for general Helmholtz*, joint with D. Li and W. Yang, J. Diff. Eqn, 393: 139-154, 2024.
10. *Energy stable semi-implicit schemes for the 2D Allen-Cahn and fractional Cahn-Hilliard equations*, to appear in IMA. J. Numer. Anal, 2025.
11. *Second order energy stable semi-implicit schemes for the 2D Allen-Cahn equation*, to appear in BIT Numer. Math., 2025.

Preprints

1. *Unconditionally stable exponential integrator schemes for the 2D Cahn-Hilliard equation*, preprint, submitted.
2. *On a Sinc-type MBE model*, joint with D. Li, C. Quan and W. Yang, submitted. ArXiv:2106.16193.
3. *Uniform boundedness of the highest norm for 2D quasilinear wave*, joint with D. Li and J. Xu, submitted. ArXiv:2104.10019.
4. *Energy stability and convergence of Strang splitting method for Cahn-Hilliard equation*, joint with D. Li, in preparation.
5. *Global well-posedness for 2D quasilinear wave equations with non-compactly supported initial data*, joint with D. Li and J. Xu, preprint.
6. *Global well-posedness of a two dimensional wave-Klein-Gordon system with small non-compactly supported data*, submitted. ArXiv:2312.00821.
7. *On semi-implicit schemes for the incompressible Euler equations via the vanishing viscosity limit*, joint with Z. Luo and S. Wang, submitted. ArXiv:2406.12320.
8. *Global well-posedness and uniform-in-time vanishing damping limit for the inviscid Oldroyd-B model*, joint with Z. Luo, Z. Yang and C. Yuan, arXiv:2410.09340.
9. *A Besov-based integration-by-parts method for the incompressible Navier-Stokes equations*, joint with Z. Luo and S. Wang, preprint arXiv:2509.23192.
10. *A sharp low regularity method for the surface quasi-geostrophic equations: a Besov framework*, joint with Z. Luo and S. Wang. Preprint, submitted.

ACADEMIC SERVICE

I have refereed articles for publications in:

1. Numerical Analysis and Scientific Computing

- *Mathematics of Computation, IMA Journal of Numerical Analysis, Advances in Computational Mathematics*

2. PDE and Analysis

- Zeitschrift für Angewandte Mathematik und Mechanik, Communications in Analysis and Mechanics, Fractional Calculus and Applied Analysis, Dynamics of Partial Differential Equations

3. Mathematical Physics

- *Classical and Quantum Gravity, Physica Scripta*

MENTORING

Phd students

- Haoran Wu (since Fall 2024)
 - Weiran Xiong (since Fall 2026)

Undergraduate students

- Xuwen Lai (since Fall 2025)

ACADEMIC VISITS AND EVENTS

Invited speaker at 2025 HKU Workshop on PDEs and Analysis 2025.11
the University of Hong Kong Hong Kong, China

Invited speaker at the 23rd Annual Conference of China Society for Industrial and Applied Mathematics (CSIAM 2025) 2025.10
China Society for Industrial and Applied Mathematics Changsha, Hunan, China

Invited speaker at the 30th International Conference on Difference Equations and Applications (ICDEA 2025) 2025.07
International Society of Difference Equations Guangzhou, Guangdong, China

Co-organizer of the Second Future-oriented Complex Systems Science – Fusion
in Interdisciplines (FOCSS) 2025.07
IICS, Fudan University Shanghai, China

Invited speaker at the Workshop in Differential Equations and Dynamical Systems 2025.06
SUSTech University *Shenzhen, Guangdong, China*

Invited speaker at the Summer Workshop on Theory, Scientific Computing,
and Optimization of Partial Differential Equations 2025.05

Chongqing Normal University

Chongqing, China

Co-organizer of the First international symposium on differential equations
and nonlinear analysis 2024.12

Fudan University

2024.12

Invited speaker at the Fourth international symposium on modeling, analysis
and applications in biomathematics 2024.06

Harbin Engineering University

Harbin, Heilongjiang, China

2024.06

Invited speaker at nonlinear analysis seminars 2024.06

Invited Speaker at Nonlinear Wuhan University of Technology

Wuhan, Hubei, China

Co-organizer and speaker of the First Future-oriented Complex Systems Science – Fusion in Interdisciplines (FOCSS) 2023.11

IICS, Fudan University

Shanghai, China

Seminar talk speaker 2023.11
Institute of Mathematical Sciences, ShanghaiTech University *Shanghai, China*

School of Mathematics, South China University of Technology *Guangzhou, Guangdong, China*

China Society for Industrial and Applied Mathematics Guangzhou, Guangdong, China

South University of Science and Technology of China Shenzhen, Guangdong, China

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Tianjin Center for Applied Mathematics (TCAM) Tianjin, China

Journal of Applied Mathematics (2011) 2011:1–10
doi:10.1155/2011/357201

Academic Visitor
Tianjin University
Tianjin, China

Washington, December

Dynamical Systems 2019.05
Society for Industrial and Applied Mathematics Snowbird, UT, US

South University of Science and Technology of China Shenzhen, Guandong, China

South University of Science and Technology of China Shenzhen, Guangdong, China

Michigan State University East Lansing, MI, US