Xinyu Cheng
Ph.D. in Mathematics

PERSONAL DETAILS

Address	Room 406, No.5 Building, Fudan University, Shanghai, China
Mail	xycheng@fudan.edu.cn
Webpage	https://sanyutsing.github.io/

EDUCATION

Doctor of Philosophy in Mathematics 2021.11
University of British Columbia
Area: Analysis, dynamics and numerics in PDEs
PhD Thesis: Analytical and numerical results for phase field, implicit free boundary, and fluid models.
<u>Advisers</u>: Prof. Li, Dong & Prof. Wetton, Brian

Masters of Science in Mathematics 2017.09
University of British Columbia
Area: Analysis, dynamics and numerics in PDEs
MSc Thesis: On the Stability of a Semi-Implicit Scheme of Cahn-Hilliard Type Equations.
<u>Advisers</u>: Prof. Li, Dong & Prof. Wetton, Brian

Bachelor of Science in Mathematics 2015.11
The Chinese University of Hong Kong
Areas: Computational & Applied Maths; Enrichment Stream in Maths.

WORKING EXPERIENCE

Young Principal Investigator 2023.12-present
Research Institute of Intelligent Complex Systems at Fudan University

Postdoc Fellow 2021.09-2023.11
the School of Mathematical Sciences at Fudan University
<u>Host</u>: Prof. Lei, Zhen.

Full-time Instructor 2018.09-2019.01
Department of Mathematics, University of British Columbia
Math 110/001: Differential Calculus 2018-2019 Winter term 1

Full-time Teaching Assistant 2015.09-2021.11
Department of Mathematics, University of British Columbia

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.

ACADEMIC SERVICE

I have refereed articles for publications in *Communications in Analysis and Mechanics, Classical and Quantum Gravity, Physica Scripta, IMA Journal of Numerical Analysis, Advances in Computational Mathematics, Fractional Calculus and Applied Analysis, Dynamics of Partial Differential Equations.*

MENTORING

Phd students

- Haoran Wu (since Fall 2024)

Undergraduate students

- Xuewen Lai (since Fall 2025)

ACADEMIC VISITS AND EVENTS

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 *Shanghai, China*

Invited speaker at the Fourth international symposium on modeling, analysis and applications in biomathematics 2024.06
Harbin Engineering University *Harbin, Heilongjiang, China*

Invited speaker at nonlinear analysis seminars 2024.06
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, ShangTech University *Shanghai,China*

Seminar talk speaker 2023.07
School of Mathematics, South China University of Technology *Guangzhou, Guangdong, China*

Invited minisymposium speaker at CSIAM 2022 2022.09
China Society for Industrial and Applied Mathematics *Guangzhou, Guangdong, China*

Academic Visitor 2021.02-2021.04

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

Invited speaker at Workshop on Analysis and PDE   2019.08
Tianjin Center for Applied Mathematics (TCAM)   *Tianjin, China*

Academic Visitor   2019.06-2019.07
Tianjin University   *Tianjin, China*

Invited minisymposium speaker at SIAM Conference on Applications of Dynamical Systems   2019.05
Society for Industrial and Applied Mathematics   *Snowbird, UT, US*

Academic Visitor   2018.07
South University of Science and Technology of China   Shenzhen, Guangdong, China

Academic Visitor   2018.04
Michigan State University   *East Lansing, MI, US*

PIMS Graduate Mathematical Modelling in Industry Workshop   2016.08
Pacific Institute for the Mathematical Sciences   *Vancouver, BC, Canada*