# Hengrong Du


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| CONTACT INFORMATION | Department of Mathematics<br>Vanderbilt University | Page: https://hengrongdu.netlify.app/<br>E-mail: hengrong.du@vanderbilt.edu |


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| RESEARCH INTERESTS | Partial differential equations, geometric measure theory, calculus of variations, stochastic analysis, fluid dynamics, and machine learning |

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| ACADEMIC POSITIONS | **Vanderbilt University**, Nashville, TN, USA<br>Postdoc Scholar (Research), Department of Mathematics<br>Mentor: **Dr. Gieri Simonett** | Sep. 2021-Aug. 2024 |
| EDUCATION | **Purdue University**, West Lafayette, IN<br>Ph.D., Mathematics<br>Advisor: **Dr. Changyou Wang** | Aug. 2016-Aug. 2021 |
| | **Beijing Normal University**, Beijing, China<br>M.S., Computational Mathematics<br>Advisor: **Dr. Jiequan Li** | Sep. 2013-July 2016 |
| | **South China Normal University**, Guangzhou, China<br>B.S., Mathematics and Applied Mathematics | Sep. 2009-July 2013 |

PUBLICATIONS& PREPRINT

**Machine Learning**

1. Yikun Bai, Rocio Diaz Martin, Hengrong Du, Ashkan Shahbazi, Soheil Kolouri. *Efficient solvers for partial Gromov-Wasserstein*, arXiv:2402.03664.

2. Haoyang Zheng, Hengrong Du, Qi Feng, Wei Deng, Guang Lin. *Constrained exploration via reflected replica exchange stochastic gradient langevin dynamics*, submitted.

3. Wei Deng, Yu Chen, Nicole Tianjiao Yang, Hengrong Du, Qi Feng, Ricky T. Q. Chen. *Reflected Schrödinger bridge for constrained generative modeling* , arXiv:2401.03228.

4. Wei Deng, Yu Chen, Nicole Tianjiao Yang, Hengrong Du, Qi Feng, Ricky T. Q. Chen. *On convergence of approximate Schrödinger bridge with bounded cost*. ICML Workshop on New Frontiers in Learning, Control, and Dynamical Systems (2023).

**Fluid Dynamics**

1. Hengrong Du, Gieri Simonett, Yuanzhen Shao. *On a thermodynamically consistent model for magnetoviscoelastic fluids in 3D*. J. Evol. Equ. 24 (2024), no. 9, 1-51.

2. Hengrong Du, Chuntian Wang. *Partial regularity for the three-dimensional stochastic Ericksen–Leslie Equations* , arXiv:2401.03662.

3. Hengrong Du, Yuanzhen Shao, Gieri Simonett. *Well-posedness for magneto-viscoelastic fluids in 3D*. Nonlinear Anal. Real World Appl. 69 (2023), no. 103759.

4. Hengrong Du, Tao Huang, Changyou Wang. *Weak compactness property of simplified nematic liquid crystal flows in dimension two*. Math. Z. 302 (2022), no. 2, 2111-2130.

5. Hengrong Du, Changyou Wang. *Global weak solutions to the stochastic Ericksen–Leslie system in dimension two.* Discrete Contin. Dyn. Syst. 42 (2022), no. 5, 2175-2197.

6. Hengrong Du, Changyou Wang. *Partial regularity of a nematic liquid crystal model with kinematic transport effects.* Nonlinearity 34 (2021), no. 5, 3001-3045.

7. Hengrong Du, Yimei Li, Changyou Wang. *Weak solutions of non-isothermal nematic liquid crystal flow in dimension three.* J. Elliptic Parabol. Equ. 6 (2020), no. 1, 71-98.

8. Hengrong Du, Xianpeng Hu, Changyou Wang. *Suitable Weak Solutions for the Co-rotational Beris–Edwards System in Dimension Three.* Arch. Ration. Mech. Anal. 238 (2020), no. 2, 749-803.

**Calculus of Variations**

1. Hengrong Du, Nung Kwan Yip. *Stability of self-similar solutions to geometric flows.* Interfaces Free Bound. 25 (2023), no. 2, 155–191.

2. Hengrong Du, Qinfeng Li, Changyou Wang. *Compactness of $M$-uniform domains and optimal thermal insulation problems.* Adv. Calc. Var. 16 (2023), no. 1, 17-43.

AWARDS

- Bilsland Dissertation Fellowship June 2020-May 2021
  It is intended to give the most accomplished final-year PhD candidates an opportunity to complete the dissertation within the 2020–21 academic year by devoting full-time effort to research and writing.

## TALKS

- AMS Special Section on Dynamics and Regularity of PDEs
  Joint Mathematics Meeting (upcoming) — January 2024
- Seminar on Analysis and Stochastic Analysis
  Auburn University (upcoming) — November 2023
- PDE Seminar
  Tennessee of Tennessee, Knoxville (upcoming) — October 2023
- PDE/Applied Math Semin
  Indiana University Bloomington (upcoming) — October 2023
- Richard F. Barry Jr. Seminar Series
  Old Dominion University — September 2023
- The 13th AIMS Conference
  University of North Carolina Wilmington — June 2023
- AMS Spring Central Sectional Meeting
  University of Cincinnati — April 2023
- Undergraduate Seminar in Mathematics
  Vanderbilt University — March 2023
- Analysis Seminar
  Wayne State University — March 2023
- 3rd Biennial Meeting of SIAM Pacific Northwest Section
  Washington State University — May 2022
- AMS Spring Central Virtual Sectional Meeting
  Purdue University — March 2022
- Graduate Online Mini-course
  Beijing Normal University — November 2021
- PDE Seminar Fall 2021
  Vanderbilt University — September 2021
- Analysis Seminar
  The University of Alabama — February 2021
- PDE Seminar
  Purdue University — September 2020
- Student Analysis Seminar
  Purdue University — February 2020
- Student Analysis Seminar
  Purdue University — February 2020
- PDE Seminar
  Purdue University — January 2020

## CONFERENCE PARTICIPATION

- Rivière-Fabes Symposium on Analysis and PDE
  University of Minnesota — Apr. 19-21, 2023
- Shanks Workshop on Advances in Mathematical and Theoretical Biology
  Vanderbilt University — Mar. 17-19, 2023
- Workshop on Geometry and Analysis of Fluid Flows
  Stony Brook University — Jan. 16-20, 2023
- AMS Fall Central Sectional Meeting

University of Texas at El Paso Sep. 17-18, 2022

- Shanks Workshop on Mathematical Aspect of Fluid Dynamics
  Vanderbilt University Feb. 19-20, 2022
- KUMUNU-ISU Conference on PDE, Dynamical Systems, and Applications
  University of Nebraska-Lincoln Oct. 23-24, 2021
- AMS Fall Western Sectional Meeting
  Online Oct. 23-24, 2021
- The 84th Midwest PDE Seminar
  Illinois Institute of Technology Oct. 26-27, 2019
- Midwest Geometry Conference 2019
  Iowa State University Sept. 6-8, 2019
- The 83rd Midwest PDE Seminar
  Indiana University Bloomington Mar. 30-31, 2019

## TEACHING EXPERIENCE

Instructor at Vanderbilt University Fall 2021-Present

- MATH 2400 Differential Equations with Linear Algebra Fall 2023
- MATH 3100 Introduction to Analysis Spring 2023
- MATH 3100 Introduction to Analysis Fall 2022
- MATH 1301 Accelerated Single-Variable Calculus II Fall 2022
- MATH 2420 Methods of Ordinary Differential Equations Spring 2022
- MATH 2400 Differential Equations with Linear Algebra Spring 2022

Recitation Instructor at Purdue University Fall 2016-Summer 2021

- MA 26200 Linear Algebra And Differential Equations Fall 2019
- MA 16200 Plane Analytic Geometry And Calculus II Spring 2019
- MA 16500 Plane Analytic Geometry And Calculus I Fall 2018