

Hengrong Du

CONTACT INFORMATION	Department of Mathematics Vanderbilt University	Page: https://hengrongdu.netlify.app/ E-mail: hengrong.du@vanderbilt.edu
RESEARCH INTERESTS	Partial differential equations, geometric measure theory, calculus of variations, stochastic analysis, fluid dynamics, and machine learning	
ACADEMIC POSITIONS	Vanderbilt University , Nashville, TN, USA Postdoc Scholar (Research), Department of Mathematics Mentor: Dr. Gieri Simonett	Sep. 2021-Aug. 2024
EDUCATION	Purdue University , West Lafayette, IN Ph.D., Mathematics Advisor: Dr. Changyou Wang Beijing Normal University , Beijing, China M.S., Computational Mathematics Advisor: Dr. Jiequan Li South China Normal University , Guangzhou, China B.S., Mathematics and Applied Mathematics	Aug. 2016-Aug. 2021 Sep. 2013-July 2016 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](https://arxiv.org/abs/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](https://arxiv.org/abs/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).

Complex Fluids

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](https://arxiv.org/abs/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

- SIAM Conference on Mathematical Aspects of Materials Science
Sheraton Pittsburgh Hotel May 2024
- AMS Special Session on Fluids: Analysis, Applications, and Beyond
Florida State University March 2024
- Financial Mathematics Seminars
Florida State University March 2024
- AMS Special Section on Dynamics and Regularity of PDEs
Joint Mathematics Meeting January 2024
- Seminar on Analysis and Stochastic Analysis
Auburn University November 2023
- PDE Seminar
Tennessee of Tennessee, Knoxville October 2023
- PDE/Applied Math Semin
Indiana University Bloomington 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 3100 Introduction to Analysis Spring 2024
- 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