

# Hengrong Du

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CONTACT INFORMATION Department of Mathematics Page: <https://hengrongdu.netlify.app/>  
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RESEARCH INTERESTS Partial differential equations, geometric measure theory, calculus of variations, stochastic analysis, fluid dynamics, and optimal transport

ACADEMIC POSITIONS **Vanderbilt University**, Nashville, TN, USA Sep. 2021-Aug. 2024  
Postdoc Scholar (Research), Department of Mathematics  
Mentor: **Dr. Gieri Simonett**

EDUCATION **Purdue University**, West Lafayette, IN Aug. 2016-Aug. 2021  
Ph.D., Mathematics  
Advisor: **Dr. Changyou Wang**

**Beijing Normal University**, Beijing, China Sep. 2013-July 2016  
M.S., Computational Mathematics  
Advisor: **Dr. Jiequan Li**

**South China Normal University**, Guangzhou, China Sep. 2009-July 2013  
B.S., Mathematics and Applied Mathematics

## PUBLICATIONS & PREPRINT

### Applications of Diffusion and Optimal Transport

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*, arXiv:2405.07839.
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).

## 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.
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

- Bilslund 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
- PDEs and Fluid Mechanics and Atmospheric Sciences  
West Virginia University April 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	<ul style="list-style-type: none"> <li>• Rivière-Fabes Symposium on Analysis and PDE University of Minnesota Apr. 19-21, 2023</li> <li>• Shanks Workshop on Advances in Mathematical and Theoretical Biology Vanderbilt University Mar. 17-19, 2023</li> <li>• Workshop on Geometry and Analysis of Fluid Flows Stony Brook University Jan. 16-20, 2023</li> <li>• AMS Fall Central Sectional Meeting University of Texas at El Paso Sep. 17-18, 2022</li> <li>• Shanks Workshop on Mathematical Aspect of Fluid Dynamics Vanderbilt University Feb. 19-20, 2022</li> <li>• KUMUNU-ISU Conference on PDE, Dynamical Systems, and Applications University of Nebraska-Lincoln Oct. 23-24, 2021</li> <li>• AMS Fall Western Sectional Meeting Online Oct. 23-24, 2021</li> <li>• The 84th Midwest PDE Seminar Illinois Institute of Technology Oct. 26-27, 2019</li> <li>• Midwest Geometry Conference 2019 Iowa State University Sept. 6-8, 2019</li> <li>• The 83rd Midwest PDE Seminar Indiana University Bloomington Mar. 30-31, 2019</li> </ul>																								
TEACHING EXPERIENCE	<table border="0"> <tbody> <tr> <td>Instructor at Vanderbilt University</td> <td>Fall 2021-Present</td> </tr> <tr> <td>• MATH 3100 Introduction to Analysis</td> <td>Spring 2024</td> </tr> <tr> <td>• MATH 2400 Differential Equations with Linear Algebra</td> <td>Fall 2023</td> </tr> <tr> <td>• MATH 3100 Introduction to Analysis</td> <td>Spring 2023</td> </tr> <tr> <td>• MATH 3100 Introduction to Analysis</td> <td>Fall 2022</td> </tr> <tr> <td>• MATH 1301 Accelerated Single-Variable Calculus II</td> <td>Fall 2022</td> </tr> <tr> <td>• MATH 2420 Methods of Ordinary Differential Equations</td> <td>Spring 2022</td> </tr> <tr> <td>• MATH 2400 Differential Equations with Linear Algebra</td> <td>Spring 2022</td> </tr> <tr> <td>Recitation Instructor at Purdue University</td> <td>Fall 2016-Summer 2021</td> </tr> <tr> <td>• MA 26200 Linear Algebra And Differential Equations</td> <td>Fall 2019</td> </tr> <tr> <td>• MA 16200 Plane Analytic Geometry And Calculus II</td> <td>Spring 2019</td> </tr> <tr> <td>• MA 16500 Plane Analytic Geometry And Calculus I</td> <td>Fall 2018</td> </tr> </tbody> </table>	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
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