

# Lucas Bouck

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## Contact

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## Education

**University of Maryland** Ph.D. in Applied Mathematics, August 2018- September 2023

Advisor: Prof. Ricardo H. Nochetto

Thesis: Liquid Crystal Variational Problems: Modeling, Analysis, and Numerics

**George Mason University** B.S., Mathematics, August 2014 - May 2018

Honors in the Major and Summa Cum Laude

Advisor: Prof. Harbir Antil

## Positions Held

Postdoctoral Associate, Carnegie Mellon University, September 2023 - current

NSF Graduate Research Fellow, University of Maryland, September 2018 - August 2023

Research Assistant, University of Maryland January 2020-August 2020

Supervisor: Prof. Ricardo H. Nochetto

Teaching Assistant, University of Maryland, August 2019- December 2019

Summer Undergraduate Research Fellowship, National Institute of Standards and Technology May 2017-August 2017

Supervisor: Dr. Ian H. Bell

## Awards

- Ivo and Renata Babuska Endowed Student Award for Graduate Research in Mathematics, UMD, May 2024. Awarded for an outstanding Ph.D. student dissertation in computational math.
- Mark E. Lachtman Award, UMD, May 2022. Awarded for excellence in research
- Aziz-Osborn Gold Medal in Teaching, UMD, May 2020.
- NSF Graduate Research Fellowship April 2018
- Brin Fellowship, UMD, April 2018
- Klaus Fischer Academic Achievement Award in Mathematics, GMU, May 2018.
- Goldwater Scholarship Honorable Mention, March 2017
- Amer Bešlagić Award, GMU, April 2016
- University Scholarship, GMU, August 2014.
- Dean's List, GMU, Fall 2014-Spring 2018

## Papers

### Preprints

1. L. Bouck, R.H. Nochetto. "Projection Free Method for Full Frank-Oseen Model of Liquid Crystals"  
<https://arxiv.org/abs/2405.03145>, 2024.

### Published

2. L. Bouck, R.H. Nochetto, S. Yang. “Reduced Membrane Model for Liquid Crystal Polymer Networks: Asymptotics and Computation.” *Journal of Mechanics and Physics of Solids*. *ArXiv link* 2024.
3. L. Bouck, R.H. Nochetto, V. Yushutin. “A hydrodynamical model of nematic liquid crystal films with a general state of orientational order” *Journal of Nonlinear Science*. *ArXiv link*, 2024.
4. L. Bouck, R.H. Nochetto, S. Yang. “Convergent FEM for a membrane model of liquid crystal polymer networks.” *SIAM Journal on Numerical Analysis*. *ArXiv link*, 2023.
5. I.H. Bell, B.K. Alpert, and L. Bouck. “ChebTools: A C++11 (and Python) Library for Working with Chebyshev Expansions.” *Journal of Open Source Software*. 2018.

## Research Talks

1. Mini-symposium at SIAM Annual Meeting, Spokane, WA, July 8 - 12, 2024
2. Mini-symposium at SIAM Mathematical Aspects of Material Science Meeting, Pittsburgh, PA, May 19 - 23, 2024
3. Special Session at AMS Spring Eastern Sectional Meeting, Howard University, Washington DC, April 6-7, 2024.
4. Center for Nonlinear Analysis Seminar, Carnegie Mellon University, Pittsburgh, PA, January 23, 2024
5. Numerical Analysis Seminar, University of Maryland, College Park, MD, October 17, 2023
6. Modeling, Computation, Nonlinearity, Randomness and Waves Seminar, University of Arizona (virtual), September 28th, 2023
7. Invited talk at Frontiers of Numerical PDEs: Fractional Differential Equations, Geometric Evolution, Liquid Crystals, Optimal Transport, and Adaptivity, College Park, MD, May 16-19, 2023
8. Applied Mathematics Seminar at Courant Institute of Mathematical Sciences, New York, NY, May 5, 2023
9. Analysis and Applied Mathematics Seminar at University of Illinois, Chicago, Chicago, IL, April 24, 2023
10. Contributed talk at East Coast Optimization Meeting (virtual), Fairfax, VA, April 14, 2023.
11. Finite Element Circus, Bridgewater, MA, March 17-18, 2023.
12. Seminar at Sandia National Laboratories, Albuquerque, NM, January 25, 2023
13. AMS Special Session at Joint Math Meetings, Boston, MA, January 5, 2023
14. UC Berkeley/Lawrence Berkeley Laboratory Applied Mathematics Seminar, Berkeley, CA, November 16, 2022
15. Mini-symposium at SIAM Texas/Louisiana Section Meeting, Houston, TX, November 4-6, 2022
16. Analysis Seminar at University of Texas, Austin, TX, November 2, 2022
17. Mid Atlantic Numerical Analysis Day, Philadelphia, PA, October 28, 2022
18. Finite Element Circus, Pittsburgh, PA, October 21-22, 2022
19. Student Research Talks, George Mason University, Fairfax, VA, September 23, 2022
20. Contributed talk at Sayas Numerics Day, University of Maryland, Baltimore County September 17, 2022
21. Numerical Analysis Seminar, University of Maryland, College Park, MD, September 2022
22. Mini-symposium at International Conference on Continuous Optimization, Bethlehem, PA July 25-28 2022
23. Mini-symposium at SIAM Annual Meeting, Pittsburgh, PA July 11-15, 2022
24. Applied Mathematics Seminar TU Dresden, DE May 31, 2022
25. Contributed Talk Workshop on Nonlinear Bending, University of Freiburg, DE May 23-25, 2022
26. Math Institute Seminar University of Freiburg, DE May 19, 2022
27. Institute for Numerical Simulation Seminar at University of Bonn, DE May 16, 2022
28. Student Research Talks George Mason University, Fairfax, VA, April 15, 2022

29. Finite Element Circus (virtual), Gainesville, FL, April 8-9, 2022
30. Finite Element Circus, State College, PA, November 5-6, 2021
31. Student Research Talks George Mason University, Fairfax, VA, February 2018
32. Applied and Computational Math Seminar Talk George Mason University, Fairfax, VA, September 2017
33. Naval Research Lab, Washington, D.C., May 2017
34. Mini-symposium at SIAM Central States Section Meeting, Ft. Collins, CO, September 2017
35. Summer Undergraduate Research Fellowship Colloquium Talk, NIST, Boulder, CO, August 2017
36. Extreems-Qed Undergraduate Research Conference, University of William and Mary, Williamsburg, VA, March 2017
37. Shenadoah Undergraduate Math and Statistics Conference, James Madison University, Harrisonburg, VA, September 2016

## Posters

1. Mathematical Models and Numerical Methods for Multiphysics Systems, Pittsburgh, PA, May 2024
2. International Conference on Liquid Crystal Elastomers, Boulder, CO, October 2023
3. SciPy Conference 2018, Austin, TX, July 2018
4. Joint Mathematics Meetings (JMM) 2018 Student Poster Session, San Diego, CA, January 2018
5. JMM 2017 Student Poster Session, Atlanta, GA, January 2017 **Outstanding Poster Award (Top 15%)**

# Teaching

## Carnegie Mellon University (CMU)

### Instructor

Fall 2024: 21-369 Numerical Methods

Spring 2024: 21-369 Numerical Methods

Fall 2023: 21-469 Computational Introduction to PDEs

### Research Mentor in Summer Undergraduate Research Apprentice Program

Summer 2024: Feliks Ma and Eric Li *Topic: Variable Step Sizes in Riemannian Optimization*

### Research Mentor in CMU SUAMI Program

Summer 2024: Jordan Banks and Stephanie Wang *Topic: Global Optimization with Application to PDEs*

## University of Maryland (UMD)

### Teaching Assistant

Fall 2019: Calculus I

### Directed Reading Program

Spring 2023: Chris Jose *Topic: Numerical Optimization*

Spring 2022: Daniel Schug *Topic: Mathematical Image Processing*

Fall 2021: Sophia Hu *Topic: Matrix Factorization for Data Science*

Spring 2020: Zhenyu Yue *Topic: Quadrature for Highly Oscillatory Integrals*

**Next Position:** PhD student in the AMSC program at The University of Maryland

## George Mason University (GMU)

### Undergraduate Learning Assistant

Spring 2017: Calculus III

**Tutor at Math Learning Center**

Fall 2016 - Spring 2018

**Grader**

Fall 2015: Discrete Mathematics

## Professional Service

### **Seminars Organized at Conferences**

Mini-symposium “Role of Numerics and Optimization in Materials Science”  
at SIAM Conference on Mathematical Aspects of Materials Science, Pittsburgh, PA, May 19-23, 2024  
*co-organized with Harbir Antil*

### **Student Seminar Talks at CMU**

Graduate Student and Postdoc Seminar February 22, 2024

### **Seminars Organized at UMD**

Spring 2023: Research Interaction Team (RIT) on Nonlinear and Nonlocal PDEs  
*co-organized with Ricardo H. Nochetto, Celine Torres, and Guillaume Bonnet*

Spring 2021: RIT on Liquid Crystal Elastomers  
*co-organized with Ricardo H. Nochetto and Shuo Yang*

Fall 2020: RIT on Liquid Crystals: Modeling, Theory, and Numerics  
*co-organized with Ricardo H. Nochetto*

Spring 2020: RIT on Liquid Crystals: Modeling, Theory, and Numerics  
*co-organized with Ricardo H. Nochetto*

### **Student Seminar Talks at UMD**

Student PDE Seminar September 26, 2022

Student PDE Seminar March 9, 2022

### **Volunteering at UMD**

Introductory Activities Coordinator for Girls Talk Math Program June 17-18, 2019

### **Refereeing**

Mathematics of Computation, SIAM Journal on Numerical Analysis, Interfaces and Free Boundaries, Computers & Mathematics with Applications, Computer Methods in Applied Mechanics and Engineering, Advances in Differential Equations