

Lucas Bouck

Contact

Email: lbouck@andrew.cmu.edu

Google Scholar: <https://scholar.google.com/citations?user=l0xOyq8AAAAAJ&hl=en>

Website: <https://lbouck.github.io/>

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

Employment

Postdoctoral Associate, Carnegie Mellon University, September 2023 - current

Mentor: Prof. Noel Walkington

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

Grants/Funding

NSF Graduate Research Fellowship Program (NSF GRFP), September 2018-August 2023, Amount: \$138,000

Publications

Preprints

1. K. Boehnlein, L. Bouck, S. Neukamm, D. Padilla-Garza, and K. Richter. “Commutativity and noncommutativity of limits in the nonlinear bending theory for prestrained microheterogeneous plates.” <https://arxiv.org/abs/2410.15679>, 2024.
2. L. Bouck, D. Padilla-Garza, and P. Plucinsky. “Plate theory for metric-constrained actuation of liquid crystal elastomer sheets.” <https://arxiv.org/abs/2410.00333>, 2024.
3. L. Bouck, R.H. Nochetto, M. Shkipov, V. Yushutin “Inf-Sup Stability of Parabolic TraceFEM.” <https://arxiv.org/abs/2409.13944>, 2024.
4. L. Bouck, R.H. Nochetto. “Projection Free Method for Full Frank-Oseen Model of Liquid Crystals” <https://arxiv.org/abs/2405.03145>, 2024.

Published

5. 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.
6. 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.
7. 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.
8. 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.

Manuscripts in Preparation

1. L. Bouck and N.J. Walkington. "HDG Method for Advection Diffusion." 2024.

Research Presentations

Seminar talks

1. Center for Nonlinear Analysis Seminar, Carnegie Mellon University, Pittsburgh, PA, January 23, 2024
2. Numerical Analysis Seminar, University of Maryland, College Park, MD, October 17, 2023
3. Modeling, Computation, Nonlinearity, Randomness and Waves Seminar, University of Arizona (virtual), September 28th, 2023
4. Applied Mathematics Seminar at Courant Institute of Mathematical Sciences, New York, NY, May 5, 2023
5. Analysis and Applied Mathematics Seminar at University of Illinois, Chicago, Chicago, IL, April 24, 2023
6. Seminar at Sandia National Laboratories, Albuquerque, NM, January 25, 2023
7. UC Berkeley/Lawrence Berkeley Laboratory Applied Mathematics Seminar, Berkeley, CA, November 16, 2022
8. Analysis Seminar at University of Texas, Austin, TX, November 2, 2022
9. Numerical Analysis Seminar, University of Maryland, College Park, MD, September 2022
10. Applied Mathematics Seminar TU Dresden, DE May 31, 2022
11. Math Institute Seminar University of Freiburg, DE May 19, 2022
12. Institute for Numerical Simulation Seminar at University of Bonn, DE May 16, 2022
13. Naval Research Lab, Washington, D.C., May 2017

Invited conference talks

14. Mini-symposium at SIAM Annual Meeting, Spokane, WA, July 8 - 12, 2024
15. Mini-symposium at SIAM Mathematical Aspects of Material Science Meeting, Pittsburgh, PA, May 19 - 23, 2024
16. Special Session at AMS Spring Eastern Sectional Meeting, Howard University, Washington DC, April 6-7, 2024.
17. Frontiers of Numerical PDEs: Fractional Differential Equations, Geometric Evolution, Liquid Crystals, Optimal Transport, and Adaptivity, College Park, MD, May 16-19, 2023
18. AMS Special Session at Joint Math Meetings, Boston, MA, January 5, 2023
19. Mini-symposium at SIAM Texas/Louisiana Section Meeting, Houston, TX, November 4-6, 2022
20. Mini-symposium at International Conference on Continuous Optimization, Bethlehem, PA July 25-28 2022
21. Mini-symposium at SIAM Annual Meeting, Pittsburgh, PA July 11-15, 2022
22. Mini-symposium at SIAM Central States Section Meeting, Ft. Collins, CO, September 2017

Contributed talks

23. Finite Element Circus, Catonsville, MD, October 18-19, 2023.
24. East Coast Optimization Meeting (virtual), Fairfax, VA, April 14, 2023.
25. Finite Element Circus, Bridgewater, MA, March 17-18, 2023.
26. Mid Atlantic Numerical Analysis Day, Philadelphia, PA, October 28, 2022
27. Finite Element Circus, Pittsburgh, PA, October 21-22, 2022
28. Sayas Numerics Day, University of Maryland, Baltimore County September 17, 2022
29. Workshop on Nonlinear Bending, University of Freiburg, DE May 23-25, 2022

30. Finite Element Circus (virtual), Gainesville, FL, April 8-9, 2022

31. Finite Element Circus, State College, PA, November 5-6, 2021

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%)**

Other Awards

From University of Maryland

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.

Brin Fellowship, UMD, April 2018

Undergraduate Awards

Klaus Fischer Academic Achievement Award in Mathematics, GMU, May 2018.

Goldwater Scholarship Honorable Mention, March 2017

Amer Bešliagić Award, GMU, April 2016

University Scholarship, GMU, August 2014.

Dean's List, GMU, Fall 2014-Spring 2018

Teaching

Carnegie Mellon University (CMU)

Instructor

Fall 2024: 21-369 Numerical Methods

Spring 2024: 21-369 Numerical Methods

Student Course Evaluation: 4.52/5

Fall 2023: 21-469 Computational Introduction to PDEs

Student Course Evaluation: 4.8/5

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

Other Student Seminars

Student Research Talks, GMU, Fairfax, VA, September 23, 2022

Student Research Talks, GMU, Fairfax, VA, April 15, 2022

Student Research Talks, GMU, Fairfax, VA, February 2018

Applied and Computational Math Seminar Talk, GMU, Fairfax, VA, September 2017

Summer Undergraduate Research Fellowship Colloquium Talk, NIST, Boulder, CO, August 2017

Extreems-Qed Undergraduate Research Conference, University of William and Mary, Williamsburg, VA, March 2017

Shenadoah Undergraduate Math and Statistics Conference, James Madison University, Harrisonburg, VA, September 2016

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