

Shawn W. Walker

CONTACT INFORMATION	Department of Mathematics Louisiana State University 210 Lockett Hall Baton Rouge, LA 70803-4918 USA	walker@math.lsu.edu http://www.math.lsu.edu/~walker/ (225) 578 - 1603
RESEARCH INTERESTS	Mathematical modeling, numerical analysis, and finite element methods (FEM) for Geometric Partial Differential Equations (PDEs). Liquid crystals, geometric evolution and free boundary problems, optimal control of PDEs.	
ACADEMIC EMPLOYMENT	Department of Mathematics, Center for Computation and Technology (CCT), Louisiana State University, Baton Rouge Professor Aug. 2022 - present Associate Professor Aug. 2016 - July 2022 Assistant Professor Aug. 2010 - July 2016 Courant Institute of Mathematical Sciences, New York University Postdoctoral Researcher and Instructor Sept. 2007 - July 2010 NSF RTG and DOE Postdoctoral Fellowship University of Maryland, College Park NSF VIGRE Research Grant, Department of Mathematics Jan. 2007 - Aug. 2007 Teaching Assistantship, Department of Mathematics Sept. 2006 - Dec. 2006 Research Assistantship Sept. 2003 - Aug. 2006 Minta Martin Fellowship (full tuition and stipend) Sept. 2002 - Aug. 2003 Yale University, New Haven, CT Research Assistantship Sept. 2001 - Aug. 2002	
EDUCATION	University of Maryland, College Park, <i>Dual Degree</i> Ph.D. in Aerospace Engineering Aug. 2007 M.Sc. in Applied Mathematics and Scientific Computing May 2007 • Advisers: Ricardo H. Nochetto and Benjamin Shapiro Yale University, New Haven, CT M.Sc. in Engineering and Applied Science May 2002 Virginia Polytechnic Institute & State University, Blacksburg B.Sc. in Electrical Engineering May 1998	
GRANT FUNDING	5. S. Walker (PI), “Geometric Control of Unfitted Finite Element Methods,” <i>National Science Foundation</i> , Computational Math Program, \$299,992, 07/01/2025 - 06/30/2028. 4. S. Walker (PI), “Controlling Geometry: Applications in Physics, Biology, and Manifold Learning,” <i>National Science Foundation</i> , Computational Math Program, \$330,002, 09/01/2021 - 08/31/2025.	

3. S. Walker (PI), “CAREER: Numerical Methods for Liquid Crystals and Their Optimal Design,” *National Science Foundation*, Computational Math **CAREER** Award Program, \$400,000, 8/1/2016 - 7/31/2021.
2. S. Walker (PI), “Numerical Analysis and Methods for Simulating Moving Interfaces and Controlling Shape,” *National Science Foundation*, Computational Math Program, \$153,520, 8/1/2014 - 7/31/2017.
1. S. Walker (PI), “Numerical Methods for Free Boundary Problems: Two-Phase Flows and Contact Line Dynamics,” *National Science Foundation*, Computational Math Program, \$90,657, 8/1/2011 - 7/31/2014.

AWARDS

3. Best Presentation Prize in the Conference on Computational Mathematics and Applications (CCMA) at University of Nevada, Las Vegas, Oct. 25-27, 2019.
2. LSU Alumni Association Rising Faculty Research Award, \$5,000, May 2016.
1. S. Walker, “Numerical Methods to Optimize Peristaltic Fluid Pumping and Artificial Swimmer Shapes,” Council On Research Summer Stipend Program, LSU, \$5,000, 7/1/2011 - 7/31/2011.

PUBLICATIONS

Journal Articles

46. Cortez, Ricardo, Lisa Fauci, **Shawn W. Walker**, “Space-time Control of Regularized Stokeslets,” *in preparation* (2026).
45. Laurain, Antoine, **Shawn W. Walker**, “Space-time Control of Stokes Swimmers,” *submitted* (2025).
44. Shahan, Jeremy T., **Shawn W. Walker**, “An Unfitted Finite Element Method for the Dynamic Landau–de Gennes Model of Nematic Liquid Crystals,” *submitted* (2025).
43. Shahan, Jeremy T., **Shawn W. Walker**, “Exact shape derivatives with unfitted finite element methods,” *Journal of Numerical Mathematics* (2025).
42. Hicks, Andrew L., **Shawn W. Walker**, “Modelling and simulation of the cholesteric Landau–de Gennes model,” *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 480, no. 2292 (2024), p. 20230813.
41. **Walker, Shawn W.**, “A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints,” *Journal of Scientific Computing*, vol. 99, no. 2 (Mar. 2024), p. 29.
40. **Walker, Shawn W.**, “Approximating the Shape Operator with the Surface Hellan–Herrmann–Johnson Element,” *SIAM Journal on Scientific Computing*, vol. 46, no. 2 (2024), A1252–A1275.
39. Surowiec, Thomas M., **Shawn W. Walker**, “Optimal Control of the Landau–de Gennes Model of Nematic Liquid Crystals,” *SIAM Journal on Control and Optimization*, vol. 61, no. 4 (2023), pp. 2546–2570.
38. Adili, Abiti, Yue Chen, Robert Lipton, **Shawn Walker**, “Controlling the dispersion of metamaterials in three dimensions,” *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 478, no. 2263 (2022), p. 20220194.
37. Koizumi, Runa, Dmitry Golovaty, Ali Alqarni, **Shawn W. Walker**, Yuriy A. Nastishin, M. Carme Calderer, Oleg D. Lavrentovich, “Toroidal nuclei of columnar lyotropic chromonic liquid crystals coexisting with an isotropic phase,” *Soft Matter*, vol. 18 (38 2022), pp. 7258–7268.
36. Liu, Pei, Javier Arsuaga, M. Carme Calderer, Dmitry Golovaty, Mariel Vazquez, **Shawn Walker**, “Helical organization of DNA-like liquid crystal filaments in

- cylindrical viral capsids,” *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, vol. 478, no. 2266 (2022), p. 20220047.
35. **Walker, Shawn W.**, “Poincaré Inequality for a Mesh-dependent 2-norm on Piecewise Linear Surfaces with Boundary,” *Computational Methods in Applied Mathematics*, vol. 22, no. 1 (2022), pp. 227–243.
 34. Chukwuemeka, Edison E., **Shawn W. Walker**, “Accelerated Gradient Descent Methods for the Uniaxially Constrained Landau-de Gennes Model,” *Advances in Applied Mathematics and Mechanics*, vol. 14, no. 1 (2021), pp. 1–32.
 33. Laurain, Antoine, **Shawn W. Walker**, “Optimal control of volume-preserving mean curvature flow,” *Journal of Computational Physics*, vol. 438 (2021), p. 110373.
 32. Liu, Pei, Javier Arsuaga, M. Carme Calderer, Dmitry Golovaty, Mariel Vazquez, **Shawn Walker**, “Ion-dependent DNA configuration in bacteriophage capsids,” *Biophysical Journal*, vol. 120, no. 16 (2021), pp. 3292–3302.
 31. Schimming, Cody D., Jorge Viñals, **Shawn W. Walker**, “Numerical method for the equilibrium configurations of a Maier-Saupe bulk potential in a Q-tensor model of an anisotropic nematic liquid crystal,” *Journal of Computational Physics*, vol. 441 (2021), p. 110441.
 30. **Walker, Shawn W.**, “The Kirchhoff Plate Equation on Surfaces: The Surface Hellan–Herrmann–Johnson Method,” *IMA Journal of Numerical Analysis*, vol. 42, no. 4 (Aug. 2021), pp. 3094–3134.
 29. Arnold, Douglas N., **Shawn W. Walker**, “The Hellan–Herrmann–Johnson Method with Curved Elements,” *SIAM Journal on Numerical Analysis*, vol. 58, no. 5 (2020), pp. 2829–2855.
 28. Borthagaray, Juan-Pablo, Ricardo H. Nochetto, **Shawn W. Walker**, “A structure-preserving FEM for the uniaxially constrained Q-tensor model of nematic liquid crystals,” *Numerische Mathematik*, vol. 145 (4 2020), pp. 837–881.
 27. Carter, Sylvester, Amit Rotem, **Shawn W. Walker**, “A domain decomposition approach to accelerate simulations of structure preserving nematic liquid crystal models,” *Journal of Non-Newtonian Fluid Mechanics*, vol. 283 (2020), p. 104335.
 26. **Walker, Shawn**, Javier Arsuaga, Lindsey Hiltner, M. Carme Calderer, Mariel Vázquez, “Fine structure of viral dsDNA encapsidation,” *Phys. Rev. E*, vol. 101 (2 Feb. 2020), p. 022703.
 25. **Walker, Shawn W.**, “A finite element method for the generalized Ericksen model of nematic liquid crystals,” *ESAIM: M2AN*, vol. 54, no. 4 (2020), pp. 1181–1220.
 24. Diegel, Amanda E., **Shawn W. Walker**, “A Finite Element Method for a Phase Field Model of Nematic Liquid Crystal Droplets,” *Communications in Computational Physics*, vol. 25 (2019), pp. 155–188.
 23. Antil, Harbir, **Shawn W. Walker**, “Optimal Control of a Degenerate PDE for Surface Shape,” *Applied Mathematics & Optimization*, vol. 78, no. 2 (Oct. 2018), pp. 297–328.
 22. Guzman, Johnny, Alexandre Madureira, Marcus Sarkis, **Shawn W. Walker**, “Analysis of the Finite Element Method for the Laplace-Beltrami Equation on Surfaces with Regions of High Curvature Using Graded Meshes,” *Journal of Scientific Computing*, vol. 77, no. 3 (Dec. 2018), pp. 1736–1761.
 21. Morvant, Angelique, Ethan Seal, **Shawn W. Walker**, “A coupled Ericksen/Allen–Cahn model for liquid crystal droplets,” *Computers & Mathematics with Applications*, vol. 75, no. 11 (2018), pp. 4048–4065.
 20. Nochetto, Ricardo H., **Shawn W. Walker**, Wujun Zhang, “The Ericksen model of liquid crystals with colloidal and electric effects,” *Journal of Computational Physics*, vol. 352 (2018), pp. 568–601.
 19. **Walker, Shawn W.**, “FELICITY: A Matlab/C++ Toolbox for Developing Finite Element Methods and Simulation Modeling,” *SIAM Journal on Scientific Computing*, vol. 40, no. 2 (2018), pp. C234–C257.

18. Davis, Christopher B., **Shawn W. Walker**, “Semi-discrete Error Estimates And Implementation Of A Mixed Method For The Stefan Problem,” *ESAIM: Mathematical Modelling and Numerical Analysis*, vol. 51 (2017), pp. 2093–2126.
17. Nochetto, Ricardo H., **Shawn W. Walker**, Wujun Zhang, “A Finite Element Method for Nematic Liquid Crystals with Variable Degree of Orientation,” *SIAM Journal on Numerical Analysis*, vol. 55, no. 3 (2017), pp. 1357–1386.
16. **Walker, Shawn W.**, “Shape Optimization of Self-Avoiding Curves,” *Journal of Computational Physics*, vol. 311 (Apr. 2016), pp. 275–298.
15. Davis, Christopher B., **Shawn W. Walker**, “A Mixed Formulation Of The Stefan Problem With Surface Tension,” *Interfaces and Free Boundaries*, vol. 17, no. 4 (Dec. 2015), pp. 427–464.
14. Laurain, Antoine, **Shawn W. Walker**, “Droplet Footprint Control,” *SIAM Journal on Control and Optimization*, vol. 53, no. 2 (2015), pp. 771–799.
13. Nochetto, Ricardo H., Abner J. Salgado, **Shawn W. Walker**, “A Diffuse Interface Model For Electrowetting With Moving Contact Lines,” *Mathematical Models and Methods in Applied Sciences*, vol. 24, no. 01 (2014), pp. 67–111.
12. **Walker, Shawn W.**, “A Mixed Formulation Of A Sharp Interface Model Of Stokes Flow With Moving Contact Lines,” *ESAIM: Mathematical Modelling and Numerical Analysis*, vol. 48 (04 July 2014), pp. 969–1009.
11. Falk, Richard S., **Shawn W. Walker**, “A Mixed Finite Element Method For EWOD That Directly Computes The Position of the Moving Interface,” *SIAM Journal on Numerical Analysis*, vol. 51, no. 2 (Mar. 2013), pp. 1016–1040.
10. Keaveny, Eric E., **Shawn W. Walker**, Michael J. Shelley, “Optimization of Chiral Structures for Microscale Propulsion,” *Nano Letters*, vol. 13, no. 2 (2013), pp. 531–537.
9. **Walker, Shawn W.**, “Tetrahedralization of Isosurfaces with Guaranteed-Quality by Edge Rearrangement (TIGER),” *SIAM Journal on Scientific Computing*, vol. 35, no. 1 (2013), A294–A326.
8. **Walker, Shawn W.**, Eric E. Keaveny, “Analysis of Shape Optimization for Magnetic Microswimmers,” *SIAM Journal on Control and Optimization*, vol. 51, no. 4 (4 2013), pp. 3093–3126.
7. Nochetto, Ricardo H., **Shawn W. Walker**, “A Hybrid Variational Front Tracking-Level Set Mesh Generator For Problems Exhibiting Large Deformations and Topological Changes,” *Journal of Computational Physics*, vol. 229, no. 18 (Sept. 2010), pp. 6243–6269.
6. **Walker, Shawn W.**, Andrea Bonito, Ricardo H. Nochetto, “Mixed Finite Element Method For Electrowetting On Dielectric With Contact Line Pinning,” *Interfaces and Free Boundaries*, vol. 12, no. 1 (Mar. 2010), pp. 85–119.
5. **Walker, Shawn W.**, Michael J. Shelley, “Shape Optimization of Peristaltic Pumping,” *Journal of Computational Physics*, vol. 229, no. 4 (4 Feb. 2010), pp. 1260–1291.
4. **Walker, Shawn W.**, Benjamin Shapiro, Ricardo H. Nochetto, “Electrowetting with contact line pinning: Computational modeling and comparisons with experiments,” *Physics of Fluids*, vol. 21, no. 10, 102103 (2009), p. 102103.
3. **Walker, Shawn W.**, Benjamin Shapiro, “Modeling the Fluid Dynamics of Electrowetting on Dielectric (EWOD),” *Journal of Microelectromechanical Systems*, vol. 15, no. 4 (Aug. 2006), pp. 986–1000.
2. Armani, Micheal, Satej Chaudhary, Roland Probst, **Shawn W. Walker**, Benjamin Shapiro, “Control of microfluidic systems: two examples, results, and challenges,” *International Journal of Robust and Nonlinear Control*, vol. 15, no. 16 (2005), pp. 785–803.
1. **Walker, Shawn W.**, Benjamin Shapiro, “A control method for steering individual particles inside liquid droplets actuated by electrowetting,” *Lab on a Chip*, vol. 5 (Oct. 2005), pp. 1404–1407.

Books and Book Chapters

3. Borthagaray, Juan Pablo, **Shawn W. Walker**, “Chapter 5 - The Q-tensor model with uniaxial constraint,” *Geometric Partial Differential Equations - Part II*, ed. by A. Bonito and R. H. Nochetto, vol. 22, Handbook of Numerical Analysis, Elsevier, 2021, pp. 313–382.
2. **Walker, Shawn W.**, *The Shapes of Things: A Practical Guide to Differential Geometry and the Shape Derivative*, 1st, vol. 28, Advances in Design and Control, Philadelphia, PA: SIAM, 2015.
1. Armani, Mike, Zach Cummins, Jian Gong, Pramod Mathai, Roland Probst, Chad Ropp, Edo Waks, **Shawn Walker**, Benjamin Shapiro, “Feedback Control of Microflows,” *Feedback Control of MEMS to Atoms*, ed. by J. J. Gorman and B. Shapiro, New York, NY: Springer US, 2012, pp. 269–319.

Conference Papers, Misc.

4. **Walker, Shawn W.**, “On The Correct Thermo-dynamic Potential for Electrostatic Dielectric Energy,” *arXiv 1803.08136* (Mar. 2018).
3. Dey, J., **Shawn W. Walker**, D. Shumilov, K. M. Kirby, Y. Luo, J. M. Mathis, “Modeling and Analysis of a Physical Tumor Model including the Effects of Necrotic Core,” *IEEE NSS-MIC 2015*, 2015.
2. Nochetto, Ricardo H., **Shawn W. Walker**, Wujun Zhang, “Numerics for Liquid Crystals with Variable Degree of Orientation,” *Symposium NN - Mathematical and Computational Aspects of Materials Science*, vol. 1753, MRS Proceedings, 2015.
1. **Walker, Shawn W.**, Benjamin Shapiro, “Modeling the Fluid Dynamics of Electro-Wetting on Dielectric (EWOD),” *Technical Proceedings of the 2004 NSTI Nanotechnology Conference and Trade Show*, vol. 2, 2004, pp. 391–394.

CONFERENCE AND
MEETING TALKS

- *Shape Variations and Level Set Methods with Unfitted Finite Element Methods*, Oberwolfach Meeting: Numerical Analysis for Geometric and Nonlinear PDEs, Mathematisches Forschungsinstitut Oberwolfach, Germany. (Feb. 5, 2026)
- *An Unfitted FEM for the Landau–de Gennes Model of Nematic Liquid Crystals*, Joint Math Meeting (JMM 2026), Washington, DC. (Jan. 7, 2026)
- *Space-time Shape Control of Stokeslet Swimmers*, 2025 Fall Southeastern Sectional AMS Meeting, Tulane University, New Orleans, LA. (Oct. 4, 2025)
- *An Unfitted FEM for the Landau–de Gennes Model of Nematic Liquid Crystals*, 8th SIAM TX-LA Sectional Meeting, University of Texas, Austin. (Sept. 26, 2025)
- *Space-time Control of Stokes Swimmers*, The 30th Biennial Numerical Analysis Conference, University of Strathclyde, Scotland. (June 25, 2025)
- *Finite Element Methods For Curvature (Plenary Talk)*, Workshop: Nonlinear Bending II, University of Freiburg, Germany. (May 27, 2025)
- *Shape Optimization with Unfitted Finite Element Methods*, 9th SIAM Central States Section Annual Meeting, University of Missouri, Kansas City. (Oct. 5, 2024)
- *Finite Element Methods For Curvature*, ICERM Workshop: PDEs and Geometry: Numerical Aspects, Brown University, Providence, RI. (Mar. 12, 2024)
- *Computing the Exact Shape Derivative with Unfitted Finite Element Methods*, Finite Element Rodeo, Rice University, Houston, TX. (Mar. 9, 2024)
- *Curvature and the HHJ Method*, WONAPDE: 7th Chiléan Workshop on Numerical Analysis of Partial Differential Equations, Concepción, Chile. (Jan. 15-19, 2024)
- *Computing the Shape Operator with the HHJ Method*, 6th SIAM TX-LA Sectional Meeting, University of Louisiana, Lafayette. (Nov. 5, 2023)
- *Shape Optimization with Unfitted Finite Element Methods*, Finite Element Circus, Notre Dame University, Indiana. (Oct. 20-21, 2023)
- *Optimal Control of Landau–de Gennes with NGSolve*, 4th NGSolve User Meeting, Portland State University. (July 9-11, 2023)

- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, Emerging Trends in Variational Models of Materials, Université de Montréal at the CRM, Canada. (June 28, 2023)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, 5th SIAM TX-LA Sectional Meeting, University of Houston. (Nov. 5, 2022)
- *Optimal Control of the Landau–de Gennes Model of Nematic Liquid Crystals*, 5th SIAM TX-LA Sectional Meeting, University of Houston. (Nov. 5, 2022)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, 2022 Fall Southeastern Sectional AMS Meeting, University of Tennessee, Chattanooga; Special Session on Applied Knot Theory III. (Oct. 16, 2022)
- *Optimal Control of the Landau–de Gennes Model of Nematic Liquid Crystals*, BIRS: Defects and Distortions of Layered Complex Fluids (**22w5159**), Banff, Canada. (Oct. 6, 2022)
- *Optimal Control of the Landau–de Gennes Model of Nematic Liquid Crystals (virtual)*, SIAM Annual Meeting: **MS99**, Pittsburgh, PA. (July 11-15, 2022)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, Finite Element Rodeo, Southern Methodist University, Dallas, TX. (Mar. 4, 2022)
- *Optimal Control of Volume-preserving Mean Curvature Flow*, 44th SIAM-SEAS (Virtual), Auburn University, Alabama. (Sept. 18, 2021)
- *A Mixed FEM for the Plate Equation on Surfaces: The Surface HHJ Method*, 15th International Conference On Free Boundary Problems: Theory & Applications (Virtual), Berlin, Germany. (Sept. 14, 2021)
- *Optimal Control of Volume-preserving Mean Curvature Flow*, 3rd Annual Meeting of the SIAM Texas-Louisiana Section (Virtual), College Station, TX (TAMU); **MS: M11**. (Oct. 17, 2020)
- *The Uniaxially Constrained \mathbf{Q} -tensor Model for Nematic Liquid Crystals*, The Joint Mathematics Meetings: AMS Special Session on Algorithms, Analysis, and Applications of Numerical PDEs (1154-65-1051), Denver, CO. (Jan. 18, 2020)
- *The Uniaxially Constrained Landau–de Gennes Model of Nematic Liquid Crystals*, Finite Element Circus, Virginia Tech, Blacksburg. (Nov. 1, 2019)
- *The Kirchhoff Plate Equation on Curved Domains and Surfaces*, Conference on Computational Mathematics and Applications at University of Nevada, Las Vegas. (Oct. 27, 2019)
- *The Kirchhoff Plate Equation on Curved Domains*, ICIAM: **MS-FT-0-3-6**, Valencia, Spain. (July 17, 2019)
- *The Curved Parametric HHJ Method for the Kirchhoff Plate Problem*, Finite Element Circus, Purdue University, West Lafayette, IN. (Mar. 22-23, 2019)
- *A Liquid Crystal Model for Virus DNA Packing*, Scientific Computing Around Louisiana (SCALA 2019), Tulane, New Orleans, LA. (Feb. 15, 2019)
- *The Plate Equation on Curved Domains and Surfaces*, Oberwolfach Meeting: Surface, Bulk, and Geometric Partial Differential Equations: Interfacial, stochastic, non-local and discrete structures, Mathematisches Forschungsinstitut Oberwolfach, Germany. (Jan. 24, 2019)
- *A Mixed Finite Element Method for 4th Order Elliptic Problems on Curved Parametric Domains*, 1st SIAM TX-LA Sectional Meeting, Louisiana State University. (Oct. 6, 2018)
- *A Finite Element Method for the Generalized Ericksen Model of Liquid Crystals*, SIAM Conference on Material Science, Portland, OR. (July 10, 2018)
- *Finite Element Methods for the Generalized Ericksen Model of Liquid Crystals*, IMA Workshop: Liquid Crystals, Metamaterials, Transformation Optics, Photonic Crystals, and Solar Cells, U of Minnesota, Minneapolis. (Feb. 28, 2018)
- *Finite Element Methods for the Generalized Ericksen Model of Liquid Crystals*, Fi-

- nite Element Rodeo, Louisiana State University, Baton Rouge. (Feb. 24, 2018)
- *Finite Elements for the Ericksen Model of Liquid Crystals with Phase-Field Modeling of Droplets*, IMA Workshop: Liquid Crystals, Soft-matter Packing, and Active Systems: Materials and Biological Applications, U of Minnesota, Minneapolis. (Jan. 16, 2018)
 - *A Finite Element Scheme for a Phase Field Model of Nematic Liquid Crystal Droplets*, Finite Element Circus, University of Maryland (Baltimore County). (Oct. 21, 2017)
 - *The Ericksen Model of Liquid Crystals with Colloidal and Electric Effects*, ENUMATH 2017 Conference, Voss, Norway. (Sept. 29, 2017)
 - *Shape Optimization of Self-Avoiding Curves*, 14th International Conference On Free Boundary Problems: Theory & Applications, Shanghai Jiao Tong University, China. (July 10-14, 2017)
 - *FELICITY: A Matlab/C++ Toolbox For Developing Finite Element Methods And Simulation Modeling*, Finite Element Circus, Rutgers University, New Brunswick, NJ. (Apr. 21-22, 2017)
 - *A Finite Element Scheme for a Phase Field Model of Nematic Liquid Crystals*, AMS Spring Southeastern Sectional Meeting, College of Charleston, SC. (Mar. 10-12, 2017)
 - *A finite element method for the Ericksen model with colloidal effects and external fields*, Variational Models of Soft Matter, Pontificia Universidad Católica de Chile. (Jan. 13, 2017)
 - *A Structure Preserving Discretization for the Ericksen Model with Colloidal Effects and External Fields*, Partial Order in Materials: Analysis, Simulations, and Beyond (Thematic Semester: Computational Mathematics in Emerging Applications), Université de Montréal at the CRM, Canada. (June 22, 2016)
 - *Introduction to Shape Optimization Problems (Tutorial)*, IMA Workshop: Frontiers in PDE-constrained Optimization, U of Minnesota, Minneapolis. (June 7, 2016)
 - *Optimizing Inclusions in Nematic Domains with the Ericksen Model*, SIAM Conference on Material Science, Philadelphia, PA. (May 11, 2016)
 - *Applications of a FEM for the Ericksen Model of Liquid Crystals*, Finite Element Circus, University of Maryland, College Park. (Apr. 15-16, 2016)
 - *Applications of a FEM for the Ericksen Model of Liquid Crystals*, Finite Element Rodeo, Texas A&M University, College Station. (Mar. 4-5, 2016)
 - *Shape Optimization of Self-Avoiding Curves*, Scientific Computing Around Louisiana (SCALA 2016), Louisiana State University, Baton Rouge. (Feb. 12-13, 2016)
 - *Droplet Footprint Control*, SIAM Conference on Analysis of Partial Differential Equations, Scottsdale, AZ. (Dec. 10, 2015)
 - *A Finite Element Method For Liquid Crystals With Variable Degree Of Orientation*, ICIAM: **MS-Th-D-25-1**, Beijing, China. (Aug. 10-14, 2015)
 - *Mixed Finite Element Method For The Stefan Problem With Surface Tension*, ICIAM: **MS-Th-E-27-1**, Beijing, China. (Aug. 10-14, 2015)
 - *A Finite Element Method For Nematic Liquid Crystals With Variable Degree Of Orientation [invited talk]*, Conference on Complex Materials: Mathematical Models and Numerical Methods, University of Oslo, Norway. (June 10-12, 2015)
 - *A Finite Element Method For Liquid Crystals With Variable Degree Of Orientation*, Finite Element Circus, George Mason University, Fairfax, VA. (Mar. 27-28, 2015)
 - *A Finite Element Method For Liquid Crystals With Variable Degree Of Orientation*, Scientific Computing Around Louisiana (SCALA 2015), Tulane University, New Orleans, LA. (Mar. 20-21, 2015)
 - *A Finite Element Method For Liquid Crystals With Variable Degree Of Orientation*, Finite Element Rodeo, Southern Methodist University, Dallas, TX. (Feb. 27-28, 2015)
 - *Numerics For Liquid Crystals With Variable Degree Of Orientation*, MRS Fall Meeting & Exhibit, Symposium NN, Boston, MA. (Dec 3, 2014)

- *Droplet Footprint Control*, Finite Element Circus, University of Minnesota, Minneapolis. (Oct. 24-25, 2014)
- *MS55: A Saddle-Point Formulation And Finite Element Method For The Stefan Problem With Surface Tension*, SIAM Annual Meeting: **MS55**, Chicago, IL. (July 7-11, 2014)
- *A saddle-point formulation and finite element method for the Stefan problem with surface tension*, Recent Developments and Challenges in Interface and Free Boundary Problems (satellite conference of the Isaac Newton Institute programme on Free Boundary Problems, Jan.-July, 2014), University of Warwick, Coventry, UK. (Mar. 25-28, 2014)
- *Optimal control of the mean curvature equation*, Finite Element Rodeo, University of Texas, Austin. (Feb. 28-Mar. 1, 2014)
- *Controlling the footprint of droplets*, Scientific Computing Around Louisiana (SCALA 2014), Louisiana State University, Baton Rouge. (Feb. 21-22, 2014)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, SIAM Conference on Analysis of Partial Differential Equations, Orlando, FL. (Dec. 7, 2013)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, ENUMATH 2013 Conference, at EPFL of Lausanne, Switzerland. (Aug. 28, 2013)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, IMA Summer Graduate Program: Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes, U of Minnesota, Minneapolis. (July 18, 2013)
- *Electrowetting: Modeling, Analysis, and Computation*, IMA Summer Graduate Program: Flow, Geometric Motion, Deformation, and Mass Transport in Physiological Processes, U of Minnesota, Minneapolis. (July 18, 2013)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, Finite Element Circus and Rodeo, Louisiana State University, Baton Rouge. (Mar. 8-9, 2013)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, Scientific Computing Around Louisiana (SCALA 2013), Tulane University, New Orleans, LA. (Feb. 15-16, 2013)
- *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, WONAPDE: 4th Chil an Workshop on Numerical Analysis of Partial Differential Equations, Concepci n, Chile. (Jan. 14-18, 2013)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, 65th Annual Meeting of the APS Division of Fluid Dynamics, San Diego, CA. (Nov. 18-20, 2012)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, Finite Element Circus, University of Pittsburgh, PA. (Oct. 19-20, 2012)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, 12th International Conference On Free Boundary Problems: Theory & Applications, Frauenchiemsee (island in the Chiemsee) near Munich, Germany. (June 11-15, 2012)
- *Error Estimates for a Mixed Formulation of Hele-Shaw Flow*, Finite Element Circus, Rutgers University, New Brunswick, NJ. (Apr. 13-14, 2012)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, 36th SIAM-SEAS, University of Alabama, Huntsville. (Mar. 24-25, 2012)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, Finite Element Rodeo, Rice University, Houston, TX. (Mar. 2-3, 2012)
- *Tetrahedralization of Isosurfaces with Guaranteed-quality by Edge Rearrangement (TIGER)*, SCALA 2012, Louisiana State University, Baton Rouge. (Jan. 20-21, 2012)

- *Optimization Of Flapping Based Locomotion*, 64th Annual Meeting of the APS Division of Fluid Dynamics, Baltimore, MD. (Nov. 20-22, 2011)
- *Mixed FEM for Hele-Shaw Flow*, Finite Element Circus, University of Connecticut, Avery Point Campus. (Oct. 14-15, 2011)
- *MS32: Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, ICIAM: **MS32**, Vancouver, Canada. (July 18-22, 2011)
- *MS183: Modeling, Analysis, and Simulation for Electrowetting On Dielectric with Contact Line Pinning*, ICIAM: **MS183**, Vancouver, Canada. (July 18-22, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Finite Element Rodeo, Texas A&M University, College Station. (Feb. 25-26, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, 63rd Annual Meeting of the APS Division of Fluid Dynamics, Long Beach, CA. (Nov. 21-23, 2010)
- *Shape Optimization of Peristaltic Pumping*, AMS Sectional Spring Eastern Meeting, NJIT, Newark, NJ. (May 22-23, 2010)

COLLOQUIA AND
SEMINAR TALKS

- *Modeling and Numerics for the Landau–de Gennes Model of Nematic Liquid Crystals*, UNT Colloquium, University of North Texas, Denton. (Oct. 27, 2025)
- *Shape Optimization with Unfitted Finite Element Methods*, Numerical Analysis Seminar, University of Duisburg-Essen, Germany. (Mar. 18, 2025)
- *Overview of Shape Optimization with Finite Element Methods*, Simons Hour Talks: Simons Collaboration on Hidden Symmetries and Fusion Energy (Virtual), Princeton University, NJ. (Mar. 28, 2024)
- *Controlling Defects in the Landau–de Gennes Model of Nematic Liquid Crystals*, Simula Company Seminar (Virtual), Oslo, Norway. (Nov. 02, 2023)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, Applied Math Seminar (Virtual), University of Arizona. (Mar. 30, 2023)
- *Controlling Defects in the Landau–de Gennes Model of Nematic Liquid Crystals*, Math Colloquium, University of Pittsburgh, PA. (Feb. 10, 2023)
- *Curvature and the HHJ Method*, Numerical Analysis Seminar, Texas A&M University, College Station. (Nov. 16, 2022)
- *Optimal Control of the Landau–de Gennes Model of Nematic Liquid Crystals (virtual)*, NASC Seminar, University of Strathclyde, UK. (Oct. 13, 2022)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, Applied Math Seminar (in person), University of Alabama, Tuscaloosa. (Apr. 22, 2022)
- *A Descent Scheme for Thick Elastic Curves with Self-contact and Container Constraints*, Research Unit Seminar (Virtual), Technische Universität Dresden, Germany. (Mar. 18, 2022)
- *Analysis and Numerics for Nematic Liquid Crystals*, Richard F. Barry Jr. Seminar Series (Virtual), Old Dominion University, Norfolk, Virginia. (Apr. 22, 2021)
- *Analysis and Numerics for Nematic Liquid Crystals*, Applied and Computational Mathematics Seminar (Virtual), University of South Carolina, Columbia. (Mar. 05, 2021)
- *Analysis and Numerics for Nematic Liquid Crystals*, Applied Mathematics Colloquium (Virtual), McMaster University, Hamilton, Ontario. (Jan. 28, 2021)
- *Optimal Control of Volume-preserving Mean Curvature Flow*, Mathematics Colloquium (Virtual), Colorado State University, Fort Collins. (Nov. 19, 2020)
- *Optimal Control of Volume-preserving Mean Curvature Flow*, Mathematics Colloquium (Virtual), Michigan Technological University, Houghton. (Oct. 16, 2020)
- *Mathematical Modeling and Numerics for Nematic Liquid Crystals*, CMAI Colloquium (Virtual), George Mason University, Fairfax, VA. (Sept. 18, 2020)
- *The Uniaxially Constrained Landau–de Gennes Model of Nematic Liquid Crystals*, Applied Math Seminar, University of Delaware, Newark. (Nov. 19, 2019)
- *The Uniaxially Constrained Landau–de Gennes Model of Nematic Liquid Crystals*,

- Numerical Analysis Seminar, Rutgers University, New Brunswick, NJ. (Nov. 15, 2019)
- *The Curved Parametric HHJ Method for the Kirchhoff Plate Problem*, Numerical Analysis Seminar, University of Maryland, College Park. (Apr. 16, 2019)
 - *A Numerical Scheme for the Generalized Ericksen Model of Liquid Crystals With Applications to Virus DNA Packing*, Applied Math Seminar, University of Illinois at Chicago. (Feb. 11, 2019)
 - *A Numerical Scheme for the Generalized Ericksen Model of Liquid Crystals With Applications to Virus DNA Packing*, Applied Math Seminar, Illinois Institute of Tech., Chicago. (Feb. 11, 2019)
 - *A Numerical Scheme for the Generalized Ericksen Model of Liquid Crystals, With Applications to Virus DNA Packing*, Computational Math Seminar, Louisiana State University, Baton Rouge. (Oct. 30, 2018)
 - *A Numerical Scheme for the Generalized Ericksen Model of Liquid Crystals, With Applications to Virus DNA Packing*, CNA Seminar, Carnegie Mellon University, Pittsburgh, PA. (Oct. 23, 2018)
 - *A Numerical Scheme for the Generalized Ericksen Model of Liquid Crystals, With Applications to Virus DNA Packing*, Applied Math Seminar, University of Delaware, Newark. (Sept. 10, 2018)
 - *Modeling and Simulating Nematic Liquid Crystals with Finite Element Methods*, Applied and Computational Mathematics Colloquium, University of Minnesota, Minneapolis. (Feb. 5, 2018)
 - *A Finite Element Scheme for a Phase Field Model of Nematic Liquid Crystal Droplets*, Computational Math Seminar, LSU, Baton Rouge, LA. (Nov. 14, 2017)
 - *A Finite Element Scheme for a Phase Field Model of Nematic Liquid Crystal Droplets*, Numerical Analysis Seminar, University of Maryland, College Park. (Oct. 17, 2017)
 - *A Finite Element Scheme For The Ericksen Model With Colloidal Effects and External Fields*, Mathematics Colloquium, Drexel University, Philadelphia, PA. (Feb. 6, 2017)
 - *A Structure Preserving Discretization For The Ericksen Model With Colloidal Effects and External Fields*, Applied Mathematics Colloquium, New Jersey Institute of Technology, Newark. (Sept. 23, 2016)
 - *Analysis and Numerics for Liquid Crystals*, Graduate Student Colloquium, Louisiana State University, Baton Rouge. (Sept. 7, 2016)
 - *A Structure Preserving Discretization For Liquid Crystals With External Fields*, Numerical Analysis Seminar, University of Maryland, College Park. (Apr. 14, 2016)
 - *Numerical Analysis For Multi-Physics Moving Interface Problems*, Mathematics Department Colloquium, Louisiana State University, Baton Rouge. (Sept. 17, 2015)
 - *A saddle-point formulation and finite element method for the Stefan problem with surface tension*, Complex Fluids Seminar, Pennsylvania State University, University Park. (Apr. 25, 2014)
 - *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, Numerical Analysis Seminar, University of Maryland, College Park. (Oct. 29, 2013)
 - *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, Numerical Analysis Seminar, George Mason University, Fairfax, VA. (Oct. 25, 2013)
 - *A new mixed formulation for a sharp interface model of Stokes flow and moving contact lines*, Numerical Analysis Seminar, University of Tennessee, Knoxville. (Sept. 25, 2013)
 - *A Sharp Interface Model of Stokes Flow and Moving Contact Lines*, Computational Math Seminar, LSU, Baton Rouge, LA. (Nov. 13, 2012)
 - *Optimization Of Flapping Based Locomotion*, Computational Math Seminar, LSU,

- Baton Rouge, LA. (Nov. 15, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Numerical Analysis and PDE Seminar, University of Delaware, Newark. (Apr. 7, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Numerical Analysis Seminar, Texas A&M University, College Station. (Mar. 23, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Computational Science Seminar, Tulane University, New Orleans, LA. (Feb. 1, 2011)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Applied & Computational Math Seminar, Georgia Tech, Atlanta. (Dec. 6, 2010)
- *Shape Optimization of Chiral Propellers in 3-D Stokes Flow*, Applied Analysis Seminar, LSU, Baton Rouge, LA. (Oct. 25, 2010)

OTHER
CONFERENCES
AND WORKSHOPS
ATTENDED

- Scientific Computing Around Louisiana (SCALA 2025), Tulane University, New Orleans (LA). (Mar. 14-15, 2025)
- Finite Element Rodeo, Louisiana State University, Baton Rouge. (Feb. 21-22, 2025)
- ICERM Workshop: *Computational Learning for Model Reduction*, Brown University, Providence, RI. (Jan. 6 - 10, 2025)
- SIAM Annual Meeting 2024, Spokane, WA. (July 8-12, 2024)
- Brin Center Workshop: Frontiers of Numerical PDEs: Fractional Differential Equations, Geometric Evolution, Liquid Crystals, Optimal Transport, and Adaptivity, University of Maryland, College Park. (May 16-19, 2023)
- Finite Element Rodeo, Texas A&M University, College Station. (Mar. 24-25, 2023)
- Scientific Computing Around Louisiana (SCALA 2023), Tulane University, New Orleans. (Mar. 10-11, 2023)
- BIRS Workshop: *Novel Mathematical Methods in Material Science: Applications to Biomaterials* (Virtual), Banff International Research Station, Canada. (June 13 - 18, 2021)
- IMSI Workshop: *Mathematical and Computational Materials Science* (Virtual), University of Chicago, IL. (Feb. 15 - 19, 2021)
- The Joint Mathematics Meetings 2020, (Virtual). (Jan. 6 - 9, 2021)
- Workshop on Mathematical Machine Learning and Application, (Virtual) Pennsylvania State University, University Park. (Dec. 14 - 16, 2020)
- SIAM Annual Meeting 2020, (Virtual). (July 6 - July 17, 2020)
- Scientific Computing Around Louisiana (SCALA 2020), Louisiana State University, Baton Rouge. (Feb. 7-8, 2020)
- ICERM Workshop: *Numerical Methods and New Perspectives for Extended Liquid Crystalline Systems*, Brown University, Providence, RI. (Dec. 9 - 13, 2019)
- IPAM Workshop: Geometry and Learning from Data Tutorials, University of California, Los Angeles. (Mar. 12-15, 2019)
- ICERM Workshop: Celebrating 75 Years of Mathematics of Computation, Brown University, Providence, RI. (Nov. 1-3, 2018)
- IMA Workshop: Mathematical Modeling of 2D Materials, University of Minnesota, Minneapolis. (May. 16-19, 2017)
- Scientific Computing Around Louisiana (SCALA 2017), Tulane University, New Orleans, LA. (Mar. 17-18, 2017)
- SIAM CSE 2017, Atlanta, GA. (Feb. 27 - Mar. 3, 2017)
- 26th International Liquid Crystal Conference, Kent State University (Liquid Crystal Institute), OH. (July 31-Aug. 5, 2016)
- NYU-Oxford (PIRE) Workshop: Mathematical Models of Defects and Patterns, New York University, New York. (Jan. 5-8, 2016)
- IMA Special Workshop: Mathematics and Mechanics in the 22nd Century: Seven Decades and Counting... (poster), Eugene, OR. (Oct. 23-25, 2015)
- ICERM Workshop: Small Clusters, Polymer Vesicles and Unusual Minima, Brown University, Providence, RI. (Mar. 16-20, 2015)

- IMA Special Workshop: Structure-Preserving Discretizations of PDEs (poster), University of Minnesota, Minneapolis. (Oct. 22-24, 2014)
- ICERM Workshop: Robust Discretization and Fast Solvers for Computable Multi-Physics Models, Brown University, Providence, RI. (May 12-16, 2014)
- Visitor at the Isaac Newton Institute for Mathematical Sciences, Cambridge, UK. (Mar. 19-31, 2014)
- Clifford Lectures, Tulane University, New Orleans, LA. (Nov. 8-11, 2013)
- Finite Element Circus, University of Delaware, Newark. (Oct. 18-19, 2013)
- International Symposium on Fractional PDEs: Theory, Numerics and Applications, Salve Regina University, Newport, RI. (June 3-5, 2013)
- 21st International Meshing Roundtable, San Jose, CA. (Oct. 7-10, 2012)
- Workshop: Advances and Challenges in Computational General Relativity (poster), Brown University, Division of Applied Mathematics. (May 20-22, 2011)
- IMA Workshop: Computing in Image Processing, Computer Graphics, Virtual Surgery, and Sports, University of Minnesota, Minneapolis. (Mar. 7-11, 2011)
- Scientific Computing Around Louisiana (SCALA 2011), Tulane University, New Orleans, LA. (Jan. 28-29, 2011)
- Joint Mathematics Meetings, New Orleans, LA. (Jan. 6-9, 2011)
- IMA Workshop: Numerical Solution of PDEs: Novel Techniques (poster); includes the Finite Element Circus on Nov. 5-6, University of Minnesota, Minneapolis. (Nov. 1-5, 2010)
- IMA Workshop: Natural Locomotion in Fluids and on Surfaces: Swimming, Flying, and Sliding, University of Minnesota, Minneapolis. (June 1-5, 2010)

MEETING
ORGANIZATION

- **(Organizer)** Brin Center Workshop: Geometric PDE Challenges in Science and Engineering, University of Maryland, College Park. (June 2-5, 2026)
- *The Finite Element Method for Problems in Multi-physics and Geometry* (Mini-symposium), The 30th Biennial Numerical Analysis Conference, University of Strathclyde. (June 24-27, 2025)
- *Numerical Methods for Geometric PDEs* (Mini-symposium), SIAM Annual Meeting, Spokane, WA. (July 8 - 12, 2024)
- **(Organizer)** Brin Center Workshop: Frontiers of Numerical PDEs: Fractional Differential Equations, Geometric Evolution, Liquid Crystals, Optimal Transport, and Adaptivity, University of Maryland, College Park. (May 16-19, 2023)
- *Liquid Crystals and Beyond: Physics, Biology, and Topology* (Mini-symposium), SIAM Annual Meeting (Hybrid), Pittsburgh, PA. (July 11 - 15, 2022)
- *Flow, Order, and Topology: Liquid Crystals, Active Matter, and Biology* (Mini-symposium), SIAM Conference on Mathematical Aspects of Materials Science (Virtual), Bilbao, Spain. (May 17 - 18, 2021)
- **(Organizer)** ICERM Workshop: *Numerical Methods and New Perspectives for Extended Liquid Crystalline Systems*, Brown University, Providence, RI. (Dec. 9 - 13, 2019)
- *Numerical Geometric PDE* (Mini-symposium), 1st SIAM TX-LA Sectional Meeting, Louisiana State University. (Oct. 5-7, 2018)
- *Biomembranes, Elastic Shells, and Complex Interfaces*, ENUMATH 2017: *Mini-symposium*, Voss, Norway. (Sept. 25 - 29, 2017)
- *Liquid Crystals and Related Models, Computation, and Applications*, SIAM CSE: *Mini-symposium*: MS149, MS176, Atlanta, GA. (Feb. 27 - Mar. 3, 2017)
- *Free Boundary Problems: Theory, Numerics, and Applications*, ICIAM: *Mini-symposium*: MS-Mo-D-09, MS-Mo-E-09, Beijing, China. (Aug. 10-14, 2015)
- *Nonlinear Fluids*, SIAM Annual Meeting: *Mini-symposium*: MS55, MS70, MS86, Chicago, IL. (July 7-11, 2014)
- **(Organizer)** Scientific Computing Around Louisiana (SCALA), Tulane University, New Orleans, LA. (Feb. 15-16, 2013)

- *Advances in Free Boundary Problems*, 36th SIAM-SEAS: *Mini-symposium*: MS4, MS27, University of Alabama, Huntsville. (Mar. 24-25, 2012)

MEMBERSHIPS American Mathematical Society (AMS), Society for Industrial and Applied Mathematics (SIAM), Materials Research Society (MRS)

PROGRAMMING SKILLS Python, C++ (OOP), Matlab, L^AT_EX, Linux.

- SOFTWARE PACKAGES
- **FELICITY**: Finite Element Implementation and Computational Interface Tool for You. This is a Matlab/C++ code for solving PDEs that are discretized by a finite element method on unstructured grids. It uses a Domain-Specific-Language (DSL) to help streamline implementation of FE discretizations (e.g. matrix assembly) by automatic code generation. The resultant sparse matrices can be manipulated in Matlab for ease in solving a PDE on a triangular (or tetrahedral) mesh. For example, users can solve Laplace-Beltrami on a 2-D surface in 3-D. Users can do higher order geometry (e.g. quadratic triangle mappings). Users can assemble matrices (bilinear and linear forms) on embedded subdomains of co-dimension ≥ 0 .
<http://www.mathworks.com/matlabcentral/fileexchange/31141-felicity/>
<http://github.com/walkersw/felicity-finite-element-toolbox/wiki>
 - **TIGER** meshing algorithm: implementation of the method in my SIAM Scientific Computing (2013) paper with a Matlab interface. Included inside the FELICITY package.
 - **AHF** and **PyAHF**: Implementation of the Array Based Half-Facet data structure for processing simplex meshes. <http://github.com/walkersw/AHF>
<http://github.com/walkersw/PyAHF>

TEACHING EXPERIENCE

Spring	2023	MATH 7330: Functional Analysis (LSU)
Spring	2022	MATH 7390: Special Topics: Geometric PDE and Numerics (LSU)
Fall	2021	MATH 4340: Partial Differential Equations (LSU)
Fall	2019, 2024	MATH 7325: Finite Element Methods (LSU)
Fall	2017	MATH 7311: Real Analysis; qualifier class (LSU)
Spring	2016	MATH 7390: Special Topics: Num. PDE Geometric Flows (LSU)
Fall	2015	MATH 4064: Numerical Linear Algebra (LSU)
Spring	2015, 2019, 2021, 2024	MATH 7710: Advanced Numerical Linear Algebra (LSU)
Fall	2025, 2022, 2018, 2016, 2014, 2012, 2010	MATH 4065: Introduction to Numerical Analysis (LSU)
Spring	2014	MATH 2065: Elementary Differential Equations (LSU)
Fall	2023	MATH 2065: Elementary Differential Equations (LSU)
Spring	2013, 2017, 2026	MATH 2057: Multidimensional Calculus (LSU)
Fall	2020	MATH 2057: Multidimensional Calculus (LSU)
Spring	2012, 2020	MATH 4066: Finite Difference Methods (LSU)
Fall	2011	MATH 7380: Special Topics: Shape Optimization (LSU)
Spring	2011	MATH 7280: Advanced Numerical Linear Algebra (LSU)
Fall	2008	V63.0123: Calculus III (NYU)
Fall	2007	V63.0123: Calculus I (NYU)
Fall	2006	MATH 141: (Teaching Assistant) Calculus II (UMD)

STUDENT
ADVISING

Member of Ph.D. Student Committees:

- Yin Feng, Dept. of Petroleum Engineering, LSU (Dean's Rep).
- Yi Li, Dept. of Physics, LSU (Dean's Rep).
- Huan Xu, Dept. of Electrical Engineering, LSU.
- Shiyuan Gu, Dept. of Mathematics, LSU.
- Lokendra Thakur, Dept. of Mathematics, LSU.
- Shawn Farlow, Dept. of Electrical Engineering, LSU (Dean's Rep).
- Jerome Weston, Dept. of Mathematics, LSU.
- Alexander Dunkel, Dept. of Mathematics, LSU.
- Abiti Adili, Dept. of Mathematics, LSU.
- Ruchira Perera, Dept. of Mathematics, LSU.
- Roozbeh Karimi, Dept. of Electrical Engineering, LSU (Dean's Rep).
- Zachary Jermain, Dept. of Mathematics, LSU.
- Laurie Richard, Dept. of Education, LSU (Dean's Rep).
- Amro Zahrawi, Dept. of Civil and Environmental Engineering, LSU.

Graduate Student Supervision:

- (Ph.D in Physics, adviser: Joyoni Dey) Krystal Kirby, Dept. of Physics, LSU.
- (M.S. in Applied Math, with thesis) Chukwudi Chukwudozie, Dept. of Petroleum Engineering, LSU.
- (M.S. in Applied Math, with thesis) Edison E. Chukwuemeka, Dept. of Mechanical Engineering, LSU.
- Abiti Adili, Dept. of Mathematics, LSU.
- Ruchira Perera, Dept. of Mathematics, LSU.
- Sulav Dhakal, Dept. of Petroleum Engineering (minor in Math), LSU.
- *Adviser* for Andrew Hicks (Graduation: Spring, 2024), Dept. of Mathematics, LSU.
- *Adviser* for Jeremy Shahan (Graduation: Spring, 2025), Dept. of Mathematics, LSU.
- *Adviser* for Han Nguyen, Dept. of Mathematics, LSU.

Undergraduate Student Supervision:

- Guillaume Dupré, Department of Mathematics, LSU, Fall 2010 - Spring 2011.
- Jonathan Heath, REU at CCT, Summer, 2013.
- Carsten Sprunger, REU at CCT, Summer, 2014.
- Daniel Bourgeois (honors option for MATH4064), Department of Mathematics, LSU, Fall 2015.
- William Reese, REU at CCT, Summer, 2016.
- Matthew Bertucci, Department of Mathematics, LSU, Fall 2016 - Fall 2017.
- Angelique Morvant and Ethan Seal, REU at CCT, Summer, 2017 (**published** a paper).
- Sylvester Carter and Amit Rotem, REU at CCT, Summer, 2019 (**published** a paper).
- Noel Dudeck, Department of Mathematics, LSU, Fall 2018 - Spring 2020.
- Benjamin Thomas (undergrad thesis, Spring 2021), Department of Mathematics, LSU, Fall 2018 - present; B. Thomas won the *Astronaut Scholarship*, Spring, 2021.
- Xinyue (Tracy) Yu, Department of Mathematics, LSU, Spring 2020 - Fall 2020.
- Rohin Gilman, Department of Mathematics, LSU, Spring 2021 - Fall 2021.
- Bridgett Slone and Andrew Fisher, REU at CCT, Summer, 2022.

SERVICE

Student Organizations Advised:

- Co-adviser of the LSU SIAM Student Chapter, 2015 - 2016; 2022-present.

University Service:

- Wrote the Real Analysis qualifier (and graded it), Dec 2017 - Aug 2018.
- Member of the Mathematics Department Executive Committee, July 2016 - June

2019.

- Member of committee to develop the undergraduate computational math concentration, 2011-present; undergraduate adviser for the computational math concentration.
- Member of CCT “Core Expertise” Search Committee, Fall 2012 - Spring 2013.
- Volunteered to help math department on annual high school math competition, Spring 2013, 2015, 2016.
- Member of Mathematics Graduate Committee, 2012 - 2015, 2018 - 2021.
- Member of Mathematics Postdoc Hiring Committee, 2024 - 2025, 2025 - 2026.
- Member of LSU-HPC Resources Allocation Committee, 2013 - present.
- Reviewed CCT-REU Applications (approximately 10 each year) for years: 2013 - 2017, 2019 - 2023.
- Contributed to NSF CAREER panel for LSU faculty, Mar. 19, 2020.

Journal Editing and Book Reviews:

- **Reviewer** for: Acta Mechanica, ACS Nano, Advances in Computational Mathematics, Applied Mathematical Modeling, Applied Mathematics Letters, Communications in Computational Physics, Computational and Applied Mathematics, Computational Materials Science, Computer-Aided Design, Computer Methods in Applied Mechanics and Engineering (CMAME), Computer Physics Communications, Computers and Fluids, Computers and Mathematics with Applications (CAMWA), European Journal of Mechanics - B/Fluids, Finite Elements in Analysis & Design, IMA Journal of Numerical Analysis, Interfaces and Free Boundaries, International Journal of Molecular Sciences, International Meshing Roundtable, Journal of Applied Mechanics, Journal of Computational and Applied Mathematics, Journal of Computational Physics, Journal of Engineering Mathematics, Journal of Fluid Mechanics, Journal of Nonlinear Science, Journal of Numerical Mathematics, Journal of Scientific Computing, Mathematical and Computer Modeling, Mathematical Modelling and Numerical Analysis (M2AN), Mathematical Models and Methods in Applied Sciences (M3AS), Mathematics of Computation, Nature Communications, Nonlinearity, Numerical Algorithms, Numerical Methods for Partial Differential Equations, Numerische Mathematik, Optimization and Engineering, Physica D: Nonlinear Phenomena, Physics of Fluids, Proceedings of the Royal Society: A, Results in Applied Mathematics, Science China, SIAM Journal of Applied Math, SIAM Journal of Control and Optimization, SIAM Journal of Numerical Analysis, SIAM Journal of Scientific Computing, Zeitschrift für Angewandte Mathematik und Mechanik (Journal of Applied Math and Mechanics).
- **Reviewer** for: SIAM Book Review, Springer Book Review.
- **Editor** for: Advances in Applied Mathematics and Mechanics (Cambridge) [Mar., 2018 - present], Advances in Continuous and Discrete Models (Springer) [Aug., 2021 - present], Journal of Numerical Mathematics (De Gruyter) [Aug., 2021 - present], International Journal of Numerical Analysis and Modeling (Global Science Press) [Feb., 2022 - present]

Service to the Profession:

- Vice-president of the SIAM TX-LA section: May 1, 2022 - April 30, 2024.

External Reviews and Committees:

- NSF Panel: Computational Math (Mar. 11-13, 2015); reviewed 11 proposals.
- NSF Panel: Computational Math (Mar. 9-11, 2016); reviewed 11 proposals.
- Chair proposal, other grant proposals.
- NSF Panel: Computational Math (Feb. 20-22, 2019); reviewed 11 proposals.
- NSF Panel: Computational Math (Feb. 28- Mar. 02, 2022); reviewed 8 proposals.
- NSF Panel: Computational Math (Feb. 27- Mar. 01, 2023); reviewed 7 proposals.
- SIAM Committee for the *George Pólya Prize for Mathematical Exposition* (2021).

Science Fairs:

- Judging: February 15, 2012, Region VII Science and Engineering Fair (Senior Division), at LSU.
- Judging: Annual Kenilworth Science Fair, at Kenilworth Science and Technology (KS&T) Middle School, Baton Rouge. Dates: Dec. 10, 2011; Dec. 8, 2012; Dec. 6, 2014; Dec. 5, 2015.
- Provided guidance for science fair projects at KS&T: Michael Sideboard 2012, Andrew Knotts 2013, 2014, 2015. They went on to win awards at external (regional) competitions.

Outreach:

- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Goodwood Branch (July 21, 2016). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: Kenilworth Science and Technology (KS&T) Middle School, Baton Rouge, LA (Feb 24, 2017). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Bluebonnet Branch (Mar 23, 2017). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Jones Creek Branch (July 20, 2017). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Zachary Branch (Oct 7, 2017). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Eden Park Branch (Apr 22, 2019). Informal hands-on presentation on liquid crystals and how they work.
- Sit-With-A-Scientist Program: East Baton Rouge Public Library (EBRPL) at the Delmont Garden's Branch (Oct 17, 2019). Informal hands-on presentation on liquid crystals and how they work.
- Geometry for Kindergartners at Lockett Hall, Math Department of LSU (Feb 16, 2022). Demonstration to kindergartners from the LSU Lab School about the use of simple shapes and geometries in science, engineering, and math through meshes.
- Geometry for Kindergartners at LSU Lab School (Mar 07, 2023). Demonstration to two kindergartner classes about the use of simple shapes and geometries in science, engineering, and math through meshes.
- Geometry for 4th grade and 5th grade at LSU Lab School (May 15, 2024). Demonstration to two classes about the use of simple shapes and geometries in science, engineering, and math through meshes.

ART

- Math Music Video, "Mathematical Modeling and Simulation of Nematic Liquid Crystals (A Montage)," YouTube (March 6, 2016), http://www.youtube.com/watch?v=pWWw7_6cQ-U

OTHER
EXPERIENCE

Control Systems Engineer, Raytheon Electronic Systems, Marlborough, MA,
June 1998 - July 2000.