

## Shawn W. Walker

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CONTACT INFORMATION	Department of Mathematics Louisiana State University 210 Lockett Hall Baton Rouge, LA 70803-4918 USA	walker@math.lsu.edu <a href="http://www.math.lsu.edu/~walker/">http://www.math.lsu.edu/~walker/</a> (225) 578 - 1603
RESEARCH INTERESTS	Numerical analysis/finite element methods (FEM), geometric evolution and free boundary problems, liquid crystals, multi-physics problems, mesh generation, optimal partial differential equation (PDE) control of shape.	
ACADEMIC EMPLOYMENT	<b>Department of Mathematics, Center for Computation and Technology (CCT), Louisiana State University, Baton Rouge</b> Associate Professor Aug. 2016 - present Assistant Professor Aug. 2010 - July 2016  <b>Courant Institute of Mathematical Sciences, New York University</b> Postdoctoral Researcher and Instructor Sept. 2007 - July 2010 NSF RTG and DOE Postdoctoral Fellowship  <b>University of Maryland, College Park</b> 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  <b>Yale University, New Haven, CT</b> Research Assistantship Sept. 2001 - Aug. 2002	
EDUCATION	<b>University of Maryland, College Park, <i>Dual Degree</i></b> Ph.D. in Aerospace Engineering Aug. 2007 M.Sc. in Applied Mathematics and Scientific Computing May 2007 • Advisors: Ricardo H. Nochetto and Benjamin Shapiro  <b>Yale University, New Haven, CT</b> M.Sc. in Engineering and Applied Science May 2002  <b>Virginia Polytechnic Institute &amp; State University, Blacksburg</b> B.Sc. in Electrical Engineering May 1998	
GRANT FUNDING	3. S. Walker (PI), "CAREER: Numerical Methods for Liquid Crystals and Their Optimal Design," <i>National Science Foundation</i> , 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," <i>National Science Foundation</i> , 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

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

25. 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.
24. **Walker, Shawn W.**, “A Finite Element Method for the Generalized Ericksen Model of Nematic Liquid Crystals,” *in preparation* (2018).
23. **Walker, Shawn W.**, “FELICITY: A Matlab/C++ Toolbox For Developing Finite Element Methods And Simulation Modeling,” *SIAM Journal on Scientific Computing (accepted)* (2018).
22. Antil, Harbir, **Shawn W. Walker**, “Optimal Control of a Degenerate PDE for Surface Shape,” *Applied Mathematics & Optimization* (2017), pp. 1–32.
21. 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.
20. Diegel, Amanda E., **Shawn W. Walker**, “A Finite Element Method for a Phase Field Model of Nematic Liquid Crystal Droplets,” *Communications in Computational Physics (accepted)* (2017).
19. Guzman, Johnny, Alexandre Madureira, Marcus Sarkis, **Shawn 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 (accepted)* (2017).
18. Morvant, Angelique, Ethan Seal, **Shawn W. Walker**, “A Coupled Ericksen/Allen-Cahn Model For Liquid Crystal Droplets,” *submitted* (2017).
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 (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 (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

1. **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, SIAM, 2015.

#### Conference Papers

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

- *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*, ENU-MATH 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 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

- 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

- *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)

- 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), American Physical Society (APS).

PROGRAMMING SKILLS MATLAB, C++ (OOP), Python, L<sup>A</sup>T<sub>E</sub>X, 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  $\geq 0$ . <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**: Implementation of the Array Based Half-Facet data structure for processing simplex meshes. <http://github.com/walkersw/AHF>



TEACHING  
EXPERIENCE

Fall 2017 MATH 7311: Real Analysis (LSU)  
Spring 2016 MATH 7390: Special Topics: Num. PDE Geometric Flows (LSU)  
Fall 2015 MATH 4064: Numerical Linear Algebra (LSU)  
Spring 2015 MATH 7710: Advanced Numerical Linear Algebra (LSU)  
Fall 2016, 2014, 2012, 2010  
Spring 2014 MATH 2065: Elementary Differential Equations (LSU)  
Spring 2013, 2017  
MATH 2057: Multidimensional Calculus (LSU)  
Spring 2012 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.

*Graduate Student Supervision:*

(Ph.D in Physics, advisor: 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 Petroleum Engineering, LSU.

*Undergraduate Student Supervision:*

Guillaume Dupré, Department of Mathematics, LSU, Fall 2010 - Spring 2011.  
Jonathan Heath, REU student at CCT, Summer, 2013.  
Carsten Sprunger, REU student at CCT, Summer, 2014.  
Daniel Bourgeois (honors option for MATH4064), Department of Mathematics, LSU, Fall 2015.  
William Reese, REU student at CCT, Summer, 2016.  
Matthew Bertucci, Department of Mathematics, LSU, Fall 2016 - present.  
Angelique Morvant, REU student at CCT, Summer, 2017.  
Ethan Seal, REU student at CCT, Summer, 2017.

## SERVICE

### *Student Organizations Advised:*

- Co-adviser of the LSU SIAM Student Chapter, since September 2012.

### *University Service:*

- 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.
- Member of LSU-HPC Resources Allocation Committee.
- Reviewed CCT-REU Applications (approximately 10 each year) for years: 2013-2017.

### *Journal Editing and Book Reviews:*

- Advances in Computational Mathematics, Applied Mathematics Letters, Communications in Computational Physics, Computational and Applied Mathematics, Computer-Aided Design, Computers and Fluids, Computers and Mathematics with Applications (CAMWA), Computer Physics Communications, European Journal of Mechanics - B/Fluids, 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 Scientific Computing, Mathematical and Computer Modeling, Mathematical Models and Methods in Applied Sciences (M3AS), Mathematics of Computation, Numerical Algorithms, Physica D: Nonlinear Phenomena, Physics of Fluids, Proceedings of the Royal Society: A, 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).
- SIAM Book Review, Springer Book Review.

### *External Reviews:*

- NSF Panel: Computational Math (March 11-13, 2015); reviewed 11 proposals.
- NSF Panel: Computational Math (March 9-11, 2016); reviewed 11 proposals.

### *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.

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](http://www.youtube.com/watch?v=pWWw7_6cQ-U)

OTHER  
EXPERIENCE

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