John LaGrone

Curriculum Vitae

Department of Mathematics
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Educational History

2016 **Ph.D. Computational and Applied Math**, *Southern Methodist University*, Dallas, Texas,
Dissertation: *Optimization and Application of Complete Radiation Boundary Conditions.*
Advisor: Prof. Thomas Hagstrom

2013 **M.S. Computational and Applied Math**, *Southern Methodist University*, Dallas, Texas.

2010 **B.S. Mathematics**, *Texas Christian University*, Fort Worth, Texas.

Employment History

2016–Present **Postdoctoral Fellow**, *Tulane University*, New Orleans, Louisiana.

2012–2016 **Research Assistant**, *Southern Methodist University*, Dallas, Texas.

2011–2012 **Teaching Assistant**, *Southern Methodist University*, Dallas, Texas.

Teaching Experience

Courses Taught at Tulane University

Fall 2018 **MATH 2210**, *(Calculus III).*

Spring 2018 **MATH 2210**, *(Calculus III).*

Fall 2017 **MATH 1310**, *(Consolidated Calculus, Combined Calculus I & II).*

Other Teaching, Mentoring Experiences, and Training

Fall 2018 **Mentor**, *Undergraduate Research in Computational Biofluids.*

- Directed a semester research project for an undergraduate student adding stochastic and chemotactic rules to a model of sea urchin sperm at Tulane University.

Spring 2018 **Mentor**, *Undergraduate Research in Computational Biofluids.*

- co-Directed a semester research project for three undergraduate students characterizing a model of sea urchin sperm at Tulane University.

Summer 2017 **Mentor**, *Research Experience for Undergraduates in Computational Biofluids.*

- co-Directed a summer research project for three undergraduate students modeling microscale swimming at Tulane University.

2016–Present **Mentor**, *Graduate students.*

- Aid in and discuss research topics, review application materials, etc.

Spring 2016 **The Teaching Institute for Graduate Students**, *Short course, Southern Methodist University.*

Publications

Journal Articles

1 J. LaGrone, R. Cortez, and L. Fauci. *Elastohydrodynamics of swimming helices: effects of flexibility and confinement.* Physical Review Fluids. 4, 033102. March 2019

2 J. LaGrone and T. Hagstrom. *Double Absorbing Boundaries for Finite Difference Time Domain Electromagnetics.* Journal of Computational Physics 326 (2016): 650-665.

Submitted

S3 J. LaGrone, R. Cortez, W. Yan, and L. Fauci. *Complex dynamics of long, flexible fibers in shear.* Submitted to Journal of Non-Newtonian Fluid Mechanics.

Software

4 J. LaGrone and T. Hagstrom. RBCPack: The Radiation Boundary Condition Package. `rbcpack.org`. *In collaboration with HyPerComp, Inc. to provide an easy-to-use interfaces to Complete Radiation Boundary Conditions and Double Absorbing Boundary Layers for a variety of numerical wave propagation solvers.* Initial Release, October 2015.

In Preparation

IP5 J. Bielak, D. Givoli, T. Hagstrom and J. LaGrone. *Complete Radiation Boundary Conditions in an Elastic Half-Space.*

IP6 B. Chakrabarti, D. Saintillan, J. LaGrone, R. Cortez, L. Fauci, Y. Liu, O. Du Roure, A. Lindner. *Helical buckling of flexible filaments in viscous flow.*

IP7 J. LaGrone, A. Burns, T. Glaeser, C. Reasonover, R. Cortez, and L. Fauci. *A computational model of chemotactic swimming for sea urchin sperm.*

Refereed Conference Proceedings and Extended Abstracts

P7 J. LaGrone, A. Burns, T. Glaeser, C. Reasonover, and R. Cortez. *Chemotaxis Modeling for Sperm Motility*, Abstract, SMB Annual Meeting 2018.

P8 J. LaGrone, L. Fauci and R. Cortez. *Simulating Bacterial Motility in Confined Environments*, Extended Abstract, IUTAM Symposium on Motile Cells in Complex Environments May 2018.

P9 J. LaGrone, L. Fauci and R. Cortez. *Influence of Driving Mechanisms on Bacterial Motility*, Abstract, SMB Annual Meeting 2017.

P10 J. LaGrone and T. Hagstrom. *High Order Radiation Boundary Conditions For Elastic Waves*, Abstract, ICOSAHOM 2016.

P11 T. Hagstrom, J. LaGrone and D. Appelö. *Optimal Radiation Boundary Conditions and Absorbing Layers for Elastic Waves*, Abstract, ECCOMAS Congress 2016.

P12 J. LaGrone and T. Hagstrom. *Double Absorbing Boundaries for Finite Difference Time Domain Electromagnetics*, Extended Abstract, Waves 2015, July 2015.

Service

Departmental Service

2016 – Present **Workshop Leader**, *BATS (Boys at Tulane in STEM) and GIST (Girls In STEM at Tulane)*, BATS and GIST are programs to provide fifth through seventh graders with the opportunity to meet and work with role models in STEM fields.

2012 – 2014 **Organized Graduate Student Seminar**, *Southern Methodist University*.

Presentations

Invited Talks

March 2019 **Helical Buckling of Elastic Fibers in Straining Flows**,
GFS follow on: Mathematics of form in active and inactive media, Isaac Newton Institute for Mathematical Sciences.

February 2019 **Numerical Simulation of Viscoelastic Fibers**,
Oakridge National Laboratory.

October 2018 **Microdynamics in Regularized Brinkman Flow**,
SIAM Texas–Louisiana Section Meeting, Louisiana State University.

July 2018 **Chemotaxis Modeling for Sperm Motility**,
Society for Mathematical Biology Annual Meeting, University of Sydney.

February 2018 **Simulating Bacterial Motility in Confined Environments**,
SIAM Southeastern Atlantic Sectional Conference, University of North Carolina, Chappel Hill.

March 2017 **Applications of Complete Radiation Boundary Conditions to Electromagnetic and Elastic Problems**,
Undergraduate Math Seminar, Xavier University of Louisiana.

June 2016 **High Order Radiation Boundary Conditions For Elastic Waves**,
International Conference on Spectral and High Order Methods 2016, Rio de Janeiro, Brazil.

January 2016 **Applications of Complete Radiation Boundary Conditions**,
RTG Seminar, Rensselaer Polytechnic Institute.

November 2015 **Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics**,
Applied Math Seminar, University of New Mexico.

July 2015 **Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics**,
Waves 2015, Karlsruhe, Germany.

Contributed Talks

May 2018 **Simulating Bacterial Motility in Confined Environments**,
IUTAM Symposium on Motile Cells in Complex Environments, Università degli Studi di Udine, Udine, Italy.

February 2018 **Simulating Bacterial Motility in Confined Environments**,
Scientific Computing Across Louisiana, Louisiana State Unniversity, Baton Rouge.

September 2017 **Simulating Bacterial Motility in Confined Environments**,
Texas Applied Mathematics and Engineering Symposium, University of Texas, Austin.

July 2017 **Influence of Driving Mechanisms on Bacterial Motility**,
Society for Mathematical Biology Annual Meeting, University of Utah, Salt Lake City.

March 2017 **Bacterial Motility in Confined Environments**,
Scientific Computing Across Louisiana, Tulane University, New Orleans.

February 2015 **Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics**,
Finite Element Rodeo, Southern Methodist University, Dallas.

Posters

January 2017 **Bacterial Motility in Confined Environments**,
Sixth Annual Winter Workshop on Neuromechanics and Dynamics of Locomotion, Tulane University, New Orleans.

July 2014 **Stable Implementation of Complete Radiation Boundary Conditions in Finite Difference Time Domain Solvers for Maxwell's Equations**,
SIAM Annual Meeting, Chicago.

Travel Awards

2018 SMB Landahl Travel Grant.
2018 Tulane Postdoctoral Fellow Summer Travel Award.
2014 NSF-CBMS Conference on Fast Direct Solvers Travel Award.
2013 Gene Golub SIAM Summer School Travel Support.

Skills

- Programming Languages: C/C++, Fortran, Python, Jupyter Notebooks, LaTeX
- High Performance Computing: MPI, OpenMP
- Applications: MATLAB, Maple, Visit, Paraview, MS Office, OpenOffice
- Documentation Systems: Sphynx, Doxygen
- Version Control: Mercurial, Git
- Scientific Libraries: Eigen, PETSc, Trilinos, deal.II, PVFMM, HDF5, VTK
- Operating Systems: Linux, Windows, macOS