

# John LaGrone

## Curriculum Vitae

Southern Methodist University  
Department of Mathematics  
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### Educational History

- 2013–May 2016 **Ph.D. Computational and Applied Math**, Southern Methodist University, Dallas, Texas, *Optimization and Application of Complete Radiation Boundary Conditions*.  
Advisor: Prof. Thomas Hagstrom
- 2011–2013 **M.S. Computational and Applied Math**, Southern Methodist University, Dallas, Texas.
- 2006–2010 **B.S. Mathematics**, Texas Christian University, Fort Worth, Texas.

### Employment History

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

### Scholarly Achievements

#### Software

- [C1] John LaGrone and Thomas. Hagstrom. RBCPack: The Radiation Boundary Condition Package. [rbcpack.org](http://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

#### Proceedings

- [P2] Thomas Hagstrom, John LaGrone and Daniel Appelö. Optimal Radiation Boundary Conditions and Absorbing Layers for Elastic Waves, Abstract, ECCOMAS Congress 2016, Submitted
- [P3] John LaGrone and Thomas Hagstrom. Double Absorbing Boundaries for Finite Difference Time Domain Electromagnetics, Extended Abstract, Waves 2015, July 2015
- [P4] John LaGrone, Fritz Juhnke, and Thomas Hagstrom. Stable Implementation of Complete Radiation Boundary Conditions in Finite Difference Time Domain Solvers for Maxwell's Equations, Abstract, SIAM AN14, July 2014

## In Preparation

- [IP5] John LaGrone and Thomas Hagstrom. Double Absorbing Boundaries for Finite Difference Time Domain Electromagnetics. *In this paper we show how to construct a Double Absorbing Boundary layer for finite difference time domain methods for Maxwell's equations and demonstrate the effectiveness with numerical experiments.*

## Works in Progress

- [IP6] John LaGrone and Thomas Hagstrom. RBCPack: a Library for Implementations of Complete Radiation Boundary Conditions. *We introduce and explain the functionality of our RBCPack library. This library provides robust and efficient algorithms to provide radiation type boundary conditions to a variety of solvers.* Planned date of submission: ACM Transactions on Mathematical Software, Spring 2016.
- [IP7] John LaGrone and Thomas Hagstrom. Optimization of Complete Radiation Boundary Conditions for Elastic Waves. *In this paper, we demonstrate that the complete radiation boundary conditions can be adapted for use in the simulation of elastic waves. We show that it is possible to optimize the parameters of the boundary conditions and demonstrate the results with numerical experiments.* Planned date of submission: Spring/Summer 2016.
- [IP8] John LaGrone, Daniel Appelö, and Thomas Hagstrom. Supergrid for Elastic Waves. *In this paper, we construct a supergrid absorbing layer for elastic waves and demonstrate the effectiveness with numerical experiments.* Planned date of submission: Spring/Summer 2016.
- [IP9] John LaGrone and Thomas Hagstrom. Complete Radiation Boundary Conditions for Sweeping Preconditioners and Fractional Diffusions. Planned date of submission: Fall 2016.

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## Presentations at Professional Meetings

- Double Absorbing Boundaries for Finite Difference Time Domain Electromagnetics. Waves 2015, Karlsruhe, Germany, July 2015
- Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics, Finite Element Rodeo, February 2015, Southern Methodist University
- (Poster) Stable Implementation of Complete Radiation Boundary Conditions in Finite Difference Time Domain Solvers for Maxwell's Equations. SIAM AN14, Chicago, July 2014

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## Colloquium and Departmental Seminars

- (Poster) Complete Radiation Boundary Conditions for Elastic Waves, SMU Research Day, February 2016, Southern Methodist University
- Applications of Complete Radiation Boundary Conditions, RTG Seminar, January 2016, Rensselaer Polytechnic Institute
- Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics, Applied Math Seminar, November 2015, University of New Mexico
- Optimization of Complete Radiation Boundary Conditions, Graduate Student Seminar, October 2015, Southern Methodist University

- Absorbing Boundaries for Maxwell's Equations, Graduate Student Seminar, March 2015, Southern Methodist University
- (Poster) Double Absorbing Boundaries for Finite-Difference Time-Domain Electromagnetics, SMU Research Day, February 2015, Southern Methodist University
- The Remez Algorithm with applications to Complete Radiation Boundary Conditions, Graduate Student Seminar, October 2014, Southern Methodist University
- (Poster) Stable Implementation of Complete Radiation Boundary Conditions in Finite Difference Time Domain Solvers for Maxwell's Equations, SMU Research Day, February 2014, Southern Methodist University
- Introduction to Fortran, Graduate Student Seminar, February 2014, Southern Methodist University
- Exponential Integrators, Graduate Student Seminar, September 2013, Southern Methodist University
- (Poster) Approximation of the Dirichlet-to-Neumann Map using a Rational Arnoldi Method with Adaptive Poles, SMU Research Day, February 2013, Southern Methodist University

## Conferences and Short Courses

- 12th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Karlsruhe, Germany, July 2015
- Finite Element Rodeo, Southern Methodist University, February 2014
- SIAM Annual Meeting, Chicago, July 2014
- Finite Element Rodeo, University of Texas, March 2014
- SIAM Workshop on Exascale Applied Mathematics Challenges and Opportunities, Chicago, July 2014
- Weekend Workshop on Fast Analysis-Based Solvers for Elliptic PDE, Dartmouth College, June 2014
- CBMS-NSF Conference: Fast Direct Solvers for Elliptic PDEs, Dartmouth College, June 2014
- The 3rd SIAG/LA International Summer School on Numerical Linear Algebra, Shanghai, China, August 2013
- Gene Golub SIAM Summer School: Matrix Functions and Matrix Equations, Shanghai, China, July-August 2013
- Finite Element Rodeo, Louisiana State University, March 2013
- NSF-CBMS Conference on Mathematical Methods of Computed Tomography, University of Texas at Arlington, May-June 2012

## Skills

- Programming Languages: C/C++, Fortran
- High Performance Computing: MPI, OpenMP
- Applications: MATLAB, Maple, VisIt, Paraview, MS Office, OpenOffice
- Version Control: Mercurial, Git
- Scientific Libraries (some experience): PETSc, Trilinos, deal.II