

Austen C. Duffy

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Date of Birth: August 16, 1980
Citizenship: United States

Education

Ph.D. Applied and Computational Mathematics, Florida State University, *expected* 2010.

DISSERTATION: Massively Parallel Hybrid Optimization Algorithms for Incompressible Multiphase Flow. (Preliminary title)

Advisor: Mark Sussman, *Co-Advisor:* M.Y. Hussaini.

M.S. Applied and Computational Mathematics, Florida State University, 2009.

M.S. Applied Mathematics, Indiana University of Pennsylvania, 2005.

THESIS: Numerical Reaction Diffusion Models for Intracellular Communication in Biology.

B.S. Mathematics, York College of Pennsylvania, 2003.

Research Interests

Computational Mathematics, Numerical Analysis and Scientific Computing

Computational Fluid Dynamics

Numerical Optimization

Numerical Solution of Partial Differential Equations

High Performance Computing

Academic Experience

FLORIDA STATE UNIVERSITY, DEPARTMENT OF MATHEMATICS

Research Assistant, Fall 2008–Present. Numerical Optimization Algorithms for incompressible multiphase flow.

Teaching Assistant, Fall 2006, Fall 2007–Spring 2008. Instructor, Pre-Calculus Algebra

Research Assistant, Spring 2007. Numerical Ship Wave Simulations.

Teaching Assistant, Fall 2005–Summer 2006, Summer 2007. Recitation Instructor/Lecture Assistant.

FLORIDA STATE UNIVERSITY, DEPARTMENT OF OCEANOGRAPHY

Research Assistant, Summer 2008. Numerical Studies of a North Atlantic Right Whale.

INDIANA UNIVERSITY OF PENNSYLVANIA, DEPARTMENT OF MATHEMATICS

Graduate Assistant, Fall 2003–Spring 2005.

Research

CURRENT

Development of faster derivative free numerical optimization algorithms for PDE constrained problems.

GPU acceleration of a CLSVOF flow solver.

Improved fluke motion for whale animation.

COMPLETED

Numerical animation of a North Atlantic Right Whale.

Numerical simulation of ship waves.

Numerical reaction diffusion models for calcium waves in egg cells.

Publications

JOURNAL ARTICLES

Austen Duffy, Anna McGregor, Ross McGregor, Douglas P. Nowacek and Mark Sussman. *Numerical animation of a North Atlantic right whale*. Submitted to Mathematics and Computers in Simulation. http://www.computationalmathematics.org/topics/files/whaleanimate_AEM.pdf

CONFERENCE PAPERS

Austen Duffy and Mark Sussman. *A GPU accelerated PCG pressure projection solver on dynamic adaptive grids*. In Preparation for SIAM conference on Parallel Processing and Scientific Computing, 2010.

UNPUBLISHED TECHNICAL REPORTS

Austen C. Duffy *An Introduction to Gradient Computation by the Discrete Adjoint Method*. Florida State University, Summer 2009. <http://www.computationalmathematics.org/topics/files/adjointtechreport.pdf>

Recent Talks

UNIVERSITY SEMINARS

Paper Discussion: "Shape optimization of surface ships in potential flow using an adjoint formulation" by Saad A. Ragab. Advanced Seminar in Applied Mathematics, Florida State University, February 26, 2009.

A Level Set based Discrete Adjoint Method for Numerical Shape Optimization. Advanced Seminar in Applied Mathematics, Florida State University, September 25, 2008.

Parallel Computing in Computational Fluid Dynamics: Compressible Flows. Advanced Topics in Parallel Computing, Florida State University, April 8, 2008.

External Support

CURRENT

SIAM student travel award to attend the 'SIAM Conference on Parallel Processing and Scientific Computing' 2010. Total award \$550.

PENDING

Multiphase flow simulation and complex shape design under uncertainty with M. Sussman and M. Y. Hussaini. Submitted to the Office of Naval Research.

GRANTS REJECTED

GPU Testing of Massively Parallel Hybrid Optimization Algorithms with M. Sussman, M.Y. Hussaini, R. van Engelen and X. Zou. Submitted to U.S. Department of Energy.

Miscellaneous

COMPUTER SKILLS

Fortran, C, C++, CUDA, OpenMP, MPI, Tecplot 360, Matlab, Scilab, Unix/Linux, SAS, L^AT_EX, Beamer, Microsoft Windows/Word/Excel/Powerpoint/Visual Studio, Openoffice, Staroffice, html, php.

GRADUATE COURSEWORK IN OTHER AREAS

Mathematical Statistics, Regression Analysis, Operations Research, Monte Carlo Methods.

PROFESSIONAL SOCIETIES

American Mathematical Society

Society for Industrial and Applied Mathematics

Pi Mu Epsilon (National Mathematics Honor Society)