

Erich L Foster

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RESEARCH INTERESTS

Finite Element Methods, Climate/Ocean Modeling, Computational Fluid Dynamics, Hydrogeology.

EDUCATION

Virginia Tech Blacksburg, Virginia - United States
Ph.D., Applied Mathematics **2013**

- Dissertation Topic: “Finite Elements for the Quasi-geostrophic Equations of the Ocean”
- Advisor: Traian Iliescu

Virginia Commonwealth University Richmond, Virginia - United States
M.Sc., Mathematics **2009**

- Thesis Topic: “An Agent Based Gene Flow Model for *Cornus florida*”
- Advisor: David Chan

University of Nevada Reno Reno, Nevada - United States
M.Sc., Hydrogeology **2006**

- Thesis Topic: “An Improved Numerical Result for Henry’s Problem of Seawater Intrusion”
- Advisor: Stephen Wheatcraft

B.Sc., Applied Mathematics **2003**
Selected Course Work: Partial Differential Equations, Numerical Methods, Linear Algebra, Computer Science, Physics, and Chemistry.

HONORS AND AWARDS

NUMERIWAVES Fellow, Basque Center for Applied Mathematics, **2013-2015**
SIAM CSE 4th BGCE Student Paper Prize Finalist, Boston, MA, **2013**

SKILLS

Operating Systems: Linux, OS X.

Programming: Python, Matlab, FORTRAN 95, C++, L^AT_EX, Perl, Java.

Software: FEniCS/DOLFIN, GMSH, Paraview, Matlab, COMSOL, Excel, MODFLOW, Aquifer Win32, ArcGIS 9.X.

Languages: English (Native), Spanish (Intermediate), German (Beginner), Basque (Beginner).

IN PREPARATION

- [P3] Denys Dutykh, Erich L Foster, Robin Goix, and Enrique Zuazua. “Optimization of Three-Dimensional Water Waves by Moving Bottom Disturbances”. *In Preparation* (2014).
- [P2] Erich L Foster and Johan Jansson. “A Stable Equal Order Finite Element Pair for the Shallow Water Equations of the Ocean”. *In Preparation* (2014).
- [P1] Erich L Foster, Jérôme Lohéac, and Minh-Binh Tran. “A Self-Similar Based Asymptotic Preserving Scheme for the Fokker-Planck Equation”. *In Preparation* (2014).

REFEREED PUBLICATIONS

- [R5] Erich L Foster, David Chan, and Rodney Dyer. “Gene Flow Modeling by Correlated Random Walk”. *In Revision* (2014).

- [R4] Erich L Foster, Traian Iliescu, and David R. Wells. “A conforming finite element discretization of the streamfunction form of the quasi-geostrophic equations”. *Submitted* (2014).
- [R3] Erich L Foster, Jérôme Lohéac, Minh-Binh Tran, and Enrique Zuazua. “An Asymptotic Preserving Scheme for Kolmogorov equation”. *Submitted* (2014).
- [R2] Erich L Foster, Traian Iliescu, and Zhu Wang. “A Finite element discretization of the streamfunction formulation of the stationary quasi-geostrophic equations of the ocean”. *Computer Methods in Applied Mechanics and Engineering* 261-262(0) (2013), pp. 105–117. DOI: 10.1016/j.cma.2013.04.008.
- [R1] Erich L. Foster, Traian Iliescu, and David R. Wells. “A two-level finite element discretization of the streamfunction formulation of the stationary quasi-geostrophic equations of the ocean”. *Computers & Mathematics with Applications* 66(7) (2013), pp. 1261–1271. DOI: 10.1016/j.camwa.2013.07.025.

INVITED TALKS

- [I3] Erich L Foster. Computational Science and Engineering. SIAM. Boston, MA, 2013.
- [I2] Erich L Foster. Computer Technolog Laboratory Seminar. KTH Royal Institute of Technology. Stockholm, 2013.
- [I1] Erich L Foster. Computer Science and Mathematics Division Seminar. Oak Ridge National Laboratory. Oak Ridge, TN, 2012.

CONTRIBUTED TALKS

- [C7] Erich L Foster. SIAM Student Conference. SIAM. Clemson, SC: Clemson/Pitt/UTK/VT, 2013.
- [C6] Erich L Foster. Fall Western Section Conference, Special Session of Geophysical Fluid Dynamics. AMS. Tucson, AZ, 2012.
- [C5] Erich L Foster. Student Conference. SIAM. Blacksburg, VA: Virginia Tech, 2012.
- [C4] Erich L Foster. Southeastern Atlantic Regional Conference on Differential Equations. Wake Forest, NC: Wake Forest University, 2012.
- [C3] Erich L Foster and James R. Overfelt. Student Intern Program Poster Session. Sandia. Albuquerque, NM, 2012.
- [C2] Erich L Foster. Student Chapter Colloquium. SIAM. Blacksburg, VA: Virginia Tech, 2011.
- [C1] Erich L Foster, Stephen W. Wheatcraft, and Aleksey S. Telyakovskiy. Poster Presentation. AGU. San Francisco: AGU Fall Meeting, 2005.

PROFESSIONAL EXPERIENCE

Basque Center for Applied Mathematics Bilbao, Basque Country - Spain
NUMERIWAVES Postdoctoral Fellow **2013 – present**
 Asymptotic preserving schemes for long time integration.

Virginia Tech Blacksburg, Virginia - United States
Teaching Assistant **2009 – 2011, 2013**
 • Math 1205: Calculus I Fall 2010, Spring 2011
 • Math 1224: Vector Geometry Fall 2009, Spring 2010, Spring 2013

Research Assistant **2011 – 2012**
 Developed a C^1 conforming FE formulation of the Pure Streamfunction form of the Quasigeostrophic Equations. Developed an optimal error estimate for a high order finite element discretization (Argyris Finite Element) of the Pure Streamfunction formulation of the Quasigeostrophic Equations.

Sandia National Labs Albuquerque, New Mexico - United States
Graduate Student Intern **Summer 2012**
 Developed a polygon clipping algorithm, which effectively dealt with degeneracies, for use in the

Community Climate System Model (CCSM). The associated FORTRAN code was developed to take advantage of High Performance Computing/Parallel Computing.

Virginia Commonwealth University

Richmond, Virginia - United States

Research Assistant

2008 – 2009

Developed an agent based model to simulate the gene flow in *Cornus florida*.

Teaching Assistant

2008

- Math 131: Introduction to Contemporary Mathematics

Spring 2008

Virginia DEQ

Richmond, Virginia

Groundwater Modeller

2006 – 2008

Analyzed regional aquifer response to groundwater withdrawals, calculating areas of impact and the response of the seawater toe, along the Coastal Plane and Eastern Shore of Virginia using MODFLOW and SHARP (a sharp interface seawater intrusion model).

INTERA Inc.

Las Vegas, Nevada - United States

Groundwater Modeller

2005 – 2006

Wrote scripts to parse out and collect data for pre and post processing of Monte Carlo simulations of large scale flow and transport models, for the DOE's Nevada Test Site, across multiple computer nodes.

University of Nevada Reno

Reno, Nevada - United States

Research Assistant

2004 – 2005

Developed code to solve the Henry's Problem of Seawater Intrusion.

Teaching Assistant

2003 – 2004

- Math 128: Trig and Algebra

Fall 2003, Spring 2004

United States Navy

Norfolk, Virginia

Nuclear Electrician's Mate

1996 – 1998

Operated the electrical plant and propulsion system aboard a nuclear submarine; maintaining proper load balance, and preventing loss of power.

STUDENT ADVISING

Basque Center for Applied Mathematics

Bilbao, Basque Country - Spain

Robin Goix

2014

PROFESSIONAL SOCIETIES

Society for Industrial and Applied Mathematics (SIAM)

American Mathematical Society (AMS)

Mathematical Association of America (MAA)