

Erich L Foster

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RESEARCH INTERESTS

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

EDUCATION

Virginia Tech

Ph.D., Applied Mathematics

Blacksburg, Virginia - United States

2013

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

Virginia Commonwealth University

M.Sc., Mathematics

Richmond, Virginia - United States

2009

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

University of Nevada Reno

M.Sc., Hydrogeology

Reno, Nevada - United States

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

SIAM CSE 4th BGCE Student Paper Prize Finalist, Boston, MA, 2013

SKILLS

Operating Systems: Linux, Mac OS X.

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

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

PUBLICATIONS

- [P5] E. L. Foster, T. Iliescu, and D. Wells. “A conforming finite element discretization of the stream-function form of the quasi-geostrophic equations”. *Submitted* (2013).
- [P4] E. L. Foster and J. R. Overfelt. “Clipping of Arbitrary Polygons with Degeneracies”. *Submitted* (2013).
- [P3] Erich L Foster, Traian Iliescu, and Zhu Wang. “A Finite element discretization of the stream-function 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.
- [P2] 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.
- [P1] E. L. Foster, D. Chan, and R. Dyer. “Gene Flow Modeling by Correlated Random Walk”. *Submitted* (2012).

INVITED TALKS

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

CONTRIBUTED TALKS

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

PROFESSIONAL EXPERIENCE

Basque Center for Applied Mathematics

NUMERIWAVES Postdoctoral Fellow

Adaptive DNS/LES for a global ocean circulation model.

Bilbao, Basque Country - Spain

2013 – present

Virginia Tech

Teaching Assistant

- Math 1205: Calculus I
- Math 1224: Vector Geometry

Blacksburg, Virginia - United States

2009 – 2011, 2013

Fall 2010, Spring 2011

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

Graduate Student Intern

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.

Albuquerque, New Mexico - United States

Summer 2012

Virginia Commonwealth University

Research Assistant

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

Richmond, Virginia - United States

2008 – 2009

Teaching Assistant

- Math 131: Introduction to Contemporary Mathematics

2008

Spring 2008

Virginia DEQ

Groundwater Modeller

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).

Richmond, Virginia

2006 – 2008

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.

PROFESSIONAL SOCIETIES

Society for Industrial and Applied Mathematics (SIAM)

American Mathematical Society (AMS)