# Erich L Foster

BCAM - Basque Center for Applied Mathematics
Alameda Mazarredo, 14
48009 Bilbao, Basque Country - Spain

phone: +34 626 905 901
email: erichlf@gmail.com
homepage: erich.no-ip.biz

## 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++, LaTeX, Perl, Java.
**Software:** FEniCS/DOLFIN, GMSH, Matlab, COMSOL, Excel, MODFLOW, Aquifer Win32, ArcGIS 9.X.

## Publications

[P6] Denys Dutykh, Erich L Foster, Robin Goix, and Enrique Zuazua. "Optimization of Three-Dimensional Water Waves by Moving Bottom Disturbances". *In Preparation* (2014).

[P5] E. L. Foster, D. Chan, and R. Dyer. "Gene Flow Modeling by Correlated Random Walk". *In Revision* (2014).

[P4] E. L. Foster, T. Iliescu, and D. Wells. "A conforming finite element discretization of the stream-function form of the quasi-geostrophic equations". *Submitted* (2014).

[P3] Erich L Foster, Jérôme Lohéac, Minh-Binh Tran, and Enrique Zuazua. "An Asymptotic Preserving Scheme for Kolmogorov equation". *In Preperation* (2014).

[P2] 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.

[P1] 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] E. L. Foster. Computational Science and Engineering. SIAM. Boston, MA, 2013.

[I2] E. L. Foster. Computer Technolog Laboratory Seminar. KTH Royal Institute of Technology. Stockholm, 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. Fall Western Section Conference, Special Session of Geophysical Fluid Dynamics. AMS. Tucson, AZ, 2012.

[C5] E. L. Foster. Southeastern Atlantic Regional Conference on Differential Equations. Wake Forest, NC: Wake Forest University, 2012.

[C4] E. L. Foster. Student Conference. SIAM. Blacksburg, VA: Virginia Tech, 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** — 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)