Fortino Garcia

Curriculum Vitae

2300 S. Rock Creek Pkwy.
Superior, CO 80027
(469) 744 7428
fortino.garcia@colorado.edu

Education

2015–Present **Ph.D. Applied Mathematics (Expected May 2021)**, *The University of Colorado Boulder*, Boulder, CO, *GPA – 4.0*.
Advisor: Daniel Appelö

2011–2015 **Bachelor of Arts, Computational and Applied Mathematics**, *Rice University*, Houston, TX, *GPA – 3.75*.

Professional Experience

2016–Present **Graduate Student/Research Assistant**, University of Colorado Boulder Department of Applied Mathematics, Boulder, CO.
- Worked on an iterative wave equation based approach to solving Helmholtz problems, particularly for problems of high frequency.

Summer 2019 **Intern**, Lawrence Livermore National Laboratory, Livermore, CA.
- Worked with Dr. Anders Petersson on a quantum optimal control problem to recover control signals that generated logical gates on a quantum computing platform.

Summer 2018 **Intern**, Total E&P USA, Houston, TX.
- Worked toward coupling spectral element and discontinuous Galerkin methods for PDE solvers. Updated in-house FORTRAN libraries to accommodate these hybrid meshes on various supercomputers.

2015–2016 **Consultant**, Slalom Consulting, Houston, TX.
- Developed Salesforce solutions for clients in the E-Commerce and medical device industry.
- Implemented custom code for nightly integrations with SAP, user friendly event check-in pages, daily bulk database manipulations, and customization for desktop and mobile devices.

2014-2015 **Developer**, CAAM Senior Design, Houston, TX.
- Mentor: Dr. Adrianna Gillman, Assistant Professor, Department of Computational and Applied Mathematics, Rice University
- Designed a mobile/tablet application written in C for numerically modeling the Wi-Fi signal distribution in a home or apartment.
- Instructions to download an Android mobile app may be found here: `http://www.caam.rice.edu/~gillmana/Wi-Fly.html`

Summer 2014 **Undergraduate Research Assistant**, Louisiana State University, Baton Rouge, LA.
- Worked on benchmarking performance of porous media flow problems through the multi-physics package OpenFOAM.
- Ran simulations on LSU's SuperMike-II supercomputing cluster and utilized the MPI profiler IPM to identify bottlenecks in the solver code.

Research Interests

Numerical Solution of PDE: I am interested in the numerical solution of PDE and PDE constrained optimization problems. In particular, I am interested in time-domain approaches to solutions of the Helmholtz equation and in the optimal control of control signals constrained by the Schrödinger equation for quantum computing systems.

High Performance Computing: I am interested in high performance implementations of numerical methods for solving PDEs. I am interested in designing algorithms which exploit the parallelism of modern many-core architectures.

Publications

Submitted

1. Daniel Appelö, Fortino Garcia, Olof Runborg. WaveHoltz: Iterative Solution of the Helmholtz Equation via the Wave Equation. Submitted to SISC.
2. N. Anders Petersson, Fortino M. Garcia, Austin E. Copeland, Ylva L. Rydin, Jonathan L. DuBois. Discrete Adjoints for Accurate Numerical Optimization with Application to Quantum Control. Submitted to JCP.

Presentations

2019 WaveHoltz: Wave Based Iterative Scheme for Helmholtz Problems. Seminar in Scientific Computing, Uppsala University, Uppsala, Sweden, December 2019.

2019 WaveHoltz: Wave Based Iterative Scheme for Helmholtz Problems. Numerical Analysis Seminar, KTH, Stockholm, Sweden, November 2019.

2019 WaveHoltz: Wave Based Iterative Scheme for Helmholtz Problems. WAVES, Vienna, Austria, August 2019.

2019 WaveHoltz: Wave Based Iterative Scheme for Helmholtz Problems. North American High Order Methods Conference, San Diego, CA, June 2019.

2019 Wave Equation Based Iterative Scheme for Helmholtz Problems. Front Range Applied Mathematics Student Conference, Denver, CO, February 2019.

2014 Profiling Porous Media Flow Problems. Mellon Mays Undergraduate Fellowship Southeast Regional Undergraduate Conference, Durham, NC, November 2014.

Posters

2019 Wave Equation Based Iterative Scheme for Helmholtz Problems (Garcia, F., Appelö, D., Runborg, O.). Poster, University of Colorado at Boulder Applied Mathematics Graduate Recruitment.

2015 A Faster and More Accurate App for Optimal Router Placement (Balkum, A., Chen, S., Garcia, F., Schwettman, S.). Poster, Rice University Engineering Design Showcase.

2014 Benchmarking Performance of Porous Media Flow Simulations (Garcia, F., Tyagi, M., Nandakumar, K.). Poster, Lousiana State University CCT REU Poster Session.

Teaching Experience

Fall 2018 **Teaching Assistant**, *University of Colorado Boulder*, Department of Applied Mathematics, Matrix Methods (APPM 3310).

Spring 2018 **Teaching Assistant**, *University of Colorado Boulder*, Department of Applied Mathematics, Calculus III for Engineers (APPM 2360).

Fall 2017 **Teaching Assistant**, *University of Colorado Boulder*, Department of Applied Mathematics, Differential Equations (APPM 2360).

Spring 2017 **Teaching Assistant**, *University of Colorado Boulder*, Department of Applied Mathematics, Calculus II for Engineers (APPM 1360).

Spring 2017 **Instructor of Note**, *University of Colorado Boulder*, Department of Applied Mathematics, Calculus II Workgroup (COEN 1360).

Fall 2016 **Teaching Assistant**, *University of Colorado Boulder*, Department of Applied Mathematics, Calculus I for Engineers (APPM 1350).

Spring 2015 **Instructor**, *Rice University*, Foundations for Self-Discovery & Lifelong Learning (UNIV 110).

Spring 2014 **Rice Learning Assistant (RLA)**, *Rice University*, Department of Computational and Applied Mathematics, Introduction to Engineering Computation Lab (CAAM 211).

University activities, service, and outreach

2018-2019 Association for Women in Mathematics (AWM) Study Session Facilitator

2013 Rice Emerging Scholars Program Student Coach.

2012-2013 Young Owls Leadership Program Advisor.

2011-2013 Volunteer tutor with the Nehemiah Center (Houston, TX).

Awards and Honors

2015 **Rice University**: CAAM-Chevron Prize.

2014-2015 **Rice University**: Mellon Mays Undergraduate Fellow.

Spring 2014 **Rice University**: President's Honor Roll.

Skills

Fortran, C/C++, OpenMP, MPI, Julia, MATLAB, Git, Perl, UNIX/Linux Environments, Mathematica, LaTeX, SQL, JavaScript, OpenFOAM, Java, HTML, CSS.