Sebastián REYES RIFFO

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Research Interests

I am attracted by the opportunity to work in a multidisciplinary team, on questions related data science and visualization, algorithm design, optimization, mathematical modeling, and numerical analysis.

Projects

09.2022 - 05.2023 **Developer.** Chilean parliamentary election maps.
- Extracted, cleansed and aggregated data using Python to create interactive maps of the last 20 elections.
- Designed and coded the project's website using Jekyll, HTML5, and CSS.

Professional Experience

10.2020 - 09.2021 **Postdoctoral researcher.** Géoazur, CNRS.
- Devised a parallelization strategy for a 27-point finite-difference solver of the Helmholtz equation, based on a Schwarz type preconditioner.
- Integrated geophysical codes in Fortran with the parallel numerical software PETSc.

02.2016 - 11.2019 **PhD student.** CEREMADE, Université Paris Dauphine-PSL.
- Developed an optimization model for bathymetry reconstruction.
- Analyzed the convergence of a blade construction procedure.
- Researched and implemented a time-parallel algorithm for unbounded in time data assimilation.
- Conceived a theoretical framework for the topics mentioned above.
- Collaborated on a french-hongkongese research project. Instructed two undergraduate courses.

06.2011 - 08.2014 **Research assistant.** CEAMOS and ISCI, Universidad de Chile.
- Studied statistical models of social behavior.
- Led a team of 10-15 people to coordinate a summer program for 400 high schools students. Taught courses on a variety of mathematical topics.

Education

2019 **PhD in Applied Mathematics.** Université Paris Dauphine-PSL.
Mathematical methods for marine energy extraction.
Thesis directed by Julien Salomon.

2015 **Master 2 in Applied Mathematics.** Université Paris Dauphine-PSL.

2013 **Mathematical Engineering.** Universidad de Chile.

Computer Skills

Programming: Python, Matlab, Fortran, MPI.

Libraries: Numpy, Pandas, Beautiful soup, Folium.

Tools: Linux, Bash, Git, LaTeX/markdown, QGIS, HTML5/CSS/Jekyll.

Languages: English (fluent), French (fluent), Spanish (native).

Teaching Experience

2017 - 2019 **Assistant teacher** (∼60h). MIDO, Université Paris Dauphine-PSL.
∘ Complex analysis, linear algebra 3.

01.2018 **Lecturer**. EdV, Universidad de Chile.
∘ An introduction to abstract algebra.

2011 - 2013 **Coordinator.** EdV, Universidad de Chile.
∘ Summer mathematics program for high school students.

2008 - 2013 **Assistant teacher** (∼160h). DIM, Universidad de Chile.
∘ Probability and statistics, introduction to partial differential equations, ordinary differential equations, algebra 1, linear algebra, single variable calculus.

Conferences

07-12.12.2020 *Time-parallelization of sequential data assimilation problems.*
26th International Conference on Domain Decomposition Methods (DD26).
Chinese University of Hong Kong, Hong Kong, China.

10-11.12.2020 12th Conference FreeFEM Days.
Laboratoire Jacques-Louis Lions (LJLL), Paris, France.

02-04.07.2019 2nd Conference on Simulation and Optimization for Renewable Marine Energies (EMRSIM19).
Roscoff marine station, Roscoff, France.

02-05.09.2018 7th Workshop on Parallel-in-Time Methods (PinT18).
Roscoff marine station, Roscoff, France.

06-10.02.2017 24th International Conference on Domain Decomposition Methods (DD24).
University of Bergen, Longyearbyen, Norway.

Awards

2015 Doctoral contract granted by École Doctorale de Dauphine.

2014 Master scholarship granted by Fondation Sciences Mathématiques de Paris.

2006 Excellence scholarship granted by Universidad de Chile.

Publications

[1] P.-H. Tournier, P. Jolivet, V. Dolean, H. Aghamiry, S. Operto and S. Riffo. *3D finite-difference and finite-element frequency-domain wave simulation with multilevel optimized additive Schwarz domain-decomposition preconditioner: A tool for full-waveform inversion of sparse node datasets*. Geophysics, 87(5), pp. T381-T402, 2022.

[2] P.-H. Cocquet, S. Riffo, J. Salomon. *Optimization of bathymetry for long waves with small amplitude*. SIAM J. Control Optim., 59(6), pp. 4429–4456, 2021.

[3] J. Ledoux, S. Riffo, J. Salomon. *Analysis of the Blade Element Momentum Theory*. SIAM J. Appl. Math., 81(6), pp. 2596–2621, 2021.