

Rodrigo Zelada Mancini, Ph.D.

✉ rodrigo.zeladamancini@cea.fr, rodrigo.zelada@ug.uchile.cl

ORCID

Google Scholar

<https://rodrigozelada.github.io>

Education

- 2021 – 2025 **Ph.D. in Applied Mathematics**, in cotutelle between the University of Chile (2021) and the University of Pau and the Adour Countries (2022-2024).
Thesis title: *Shape optimization for thin layer heat exchangers*.
- 2019 – 2020 **Master in Engineering Sciences, minor Applied Mathematics**, University of Chile.
Thesis title: *Hydrodynamic model for red tides on quellón bay*.
- 2016 – 2018 **Additional Specialization: Minor in Astronomy**, University of Chile.
- 2013 – 2019 **Mathematical Engineer**, University of Chile.

Experience

- 2025 – ···· **Postdoctoral researcher**, CEA Paris-Saclay (French Alternative Energies and Atomic Energy Commission), École polytechnique, Inria Saclay. Mentors: Alexandre Imperiale (CEA) and Philippe Moireau (École polytechnique, Inria). Parameter estimation of effective transmission conditions from ultrasonic data to solve a parametric set of equations (acoustic wave and elastodynamics) with a varying angle, in a domain with a non-periodic rough boundary.
- 2021 – 2025 **Ph.D. thesis**. University of Chile / University of Pau and the Adour Countries. Shape optimization for a heat exchanger problem with a solid thin layer, where we do an asymptotic development to avoid meshing the solid domain, leading to non-standard transmission conditions which involves discontinuities and the Laplace-Beltrami operator at the interface. Supervisors: Carlos Conca (University of Chile), Fabien Caubet and Marc Dambrine (University of Pau and the Adour Countries).
- 2020 – 2021 **Supply Chain Analyst** (Industry) Fork Chile.
 - Implementation of Machine Learning algorithms and Statistical tools to predict sales (Forecasting).
 - Development of a model that integrates production, inventory and distribution of perishable products in a supply chain environment, where the products have different shelf-lives.
- 2019 – 2020 **Master thesis**. University of Chile. Advisors: Carlos Conca, Co-advisor: Jorge San Martín. Implementation of the Navier-Stokes equations and the Advection-Diffusion equation in MATLAB, using the Finite Volume Method. Comparison of the solutions obtained in MATLAB with the open source CFD software OpenFOAM, in which we modified a solver.
- January 2019 **Professional internship III**. Validation of numerical algorithms for the Stokes and the Navier-Stokes equations at CMM (Center for Mathematical Modelling). Supervision: Raúl Gormaz.
- January 2018 **Professional internship II**. A computational algorithm for the Legendre-Fenchel conjugate at DIM (Department of Mathematical Engineering, University of Chile). Supervision: Abderrahim Hantoute.

Experience (continued)

January 2017  **Professional internship I.** Maximum Entropy Method for radio astronomical synthesis image at DAS (Department of Astronomy, University of Chile). Supervision: Simón Cassasus, Pablo Román and Axel Osses.

Research Publications

Journal Articles

- 1 F. Caubet, C. Conca, M. Dambrine, and R. Zelada, “Shape Optimization with Ventcel Transmission Condition: Application to the Design of a Heat Exchanger,” *SIAM J. Sci. Comput.*, vol. 48, no. 2, B113–B140, 2026, ISSN: 1064-8275,1095-7197.  DOI: 10.1137/25M1751360
- 2 D. Capatina, F. Caubet, M. Dambrine, and R. Zelada, “Nitsche extended finite element method of a Ventcel transmission problem with discontinuities at the interface,” *ESAIM Math. Model. Numer. Anal.*, vol. 59, no. 2, pp. 999–1021, 2025, ISSN: 2822-7840,2804-7214.  DOI: 10.1051/m2an/2025014
- 3 F. Caubet, C. Conca, M. Dambrine, and R. Zelada, “How to insulate a pipe?” *J. Optim. Theory Appl.*, vol. 207, no. 3, Paper No. 46, 41, 2025, ISSN: 0022-3239,1573-2878.  DOI: 10.1007/s10957-025-02782-6

Conference Proceedings

- 1 F. Caubet, C. Conca, M. Dambrine, and R. Zelada, “Shape optimization for heat exchangers with a thin layer,” in *Sixteenth International Conference Zaragoza-Pau on Mathematics and its Applications*, ser. Monogr. Mat. García Galdeano, vol. 43, Prensas Univ. Zaragoza, Zaragoza, 2024, pp. 51–61, ISBN: 978-84-1340-791-3.

Submitted for review

- 1 R. Zelada, A. Imperiale, and P. Moireau, “Inverse problem for estimating effective parameters of an asymptotic model for transient elastic wave propagation in a domain with a non-periodic rough boundary,” 2026.

Conferences

June 2026 (expected)	Inverse problem for estimating effective parameters of an asymptotic model for transient elastic wave propagation in a domain with a non-periodic rough boundary, 17th International Conference on Mathematical and Numerical Aspects of Wave Propagation, Montreal, Canada.
September 2026	Shape optimization for thin layers heat exchangers, CEA List, Digiteo, Saclay, France.
September 2024	Shape optimization with discontinuities at the interface, 17th International Conference Zaragoza-Pau on Mathematics and its Applications, Jaca, Spain.
May 2024	Shape optimization with discontinuities at the interface, 46th National Congress on Numerical Analysis, Île de Ré, France.
May 2023	Nitsche extended finite element method of a Ventcel transmission problem with discontinuities at the interface, MARGAUX PhD Days, Poitiers, France.
September 2022	Shape optimization for a heat exchanger with a thin layer, 16th International Conference Zaragoza-Pau on Mathematics and its Applications, Jaca, Spain.
May 2022	Shape optimization for a heat exchanger with a thin layer, MARGAUX PhD days, Bordeaux, France.

Conferences (continued)

November 2020 Poster presentation: Hydrodynamical model of Red Tide in Quellón Bay. Workshop CeBIB (Center for Biotechnology and Bioengineering), Puyehue.

Teaching

Fall 2016 Test grader MA2002 - Advanced Calculus.
Spring 2016 Test grader MA2002 - Advanced Calculus.
Fall 2019 (Postgraduate course) Teacher's assistant MA5602 - Evolution Problems.
Spring 2019 Teacher's assistant MA1101 - Introduction to Algebra.
Tutor SIPEE's Program MA1102 - Introduction to Algebra.
Test grader MA1002 - Single Variable Calculus.
Tutor SIPEEE's Program MA1002 - Single Variable Calculus.
Test grader MA1102 - Linear Algebra.
Spring 2021 Teacher's Assistant MA1102 - Linear Algebra.
Teacher's Assistant MA2002 - Advanced Calculus.
Teacher's Assistant MA3701 - Optimization.

Programming tools

Coding C++, Python, Matlab, Fortran, HTML.
Optimization Null-space algorithm, NLOpt, scipy.
Mesh generation Gmsh, Salome, mmg.
Postprocessing ParaView.
FEM FreeFem++, FEniCS.
FVM OpenFOAM.
Parallel tools MPI, OpenMP, TBB.

Service to the community

Organizer of events Co-organizer of the workshop *Waves and Surface Effect: Mathematical modelling, numerical analysis and inverse problems* at CEA Paris-Saclay, with the participation of different colleagues from french universities and some internationals.

Miscellaneous

Awards and Achievements

2025 **Highlighted Postgraduate Thesis**, FCFM, University of Chile.
2021 **Doctoral grant**, ANID.
2018 **Highlighted Student**, FCFM, University of Chile.

Languages

2024 **French**: Proficient (DALF C1 – Diplôme Approfondi de Langue Française).
English: Upper-Intermediate (Cambridge B2 First – First Certificate in English).