Sebastián Zamorano Aliaga

Department of Mechanics, Design and Industrial Organization
Faculty of Engineering, University of Deusto
Avda. Universidades 24, 48007, Bilbao, Basque Country, Spain
sebastian.zamorano@deusto.es
sites.google.com/view/sebastian-zamorano
Born in January 6, 1986, Santiago, Chile

WoS: AAY-2547-2020 Scopus: 16644226500 Orcid: 0000-0001-5592-9085

I am currently a teaching and Research Professor at the University of Deusto and a Humboldtian who received a Research Fellowship for Experienced Researchers. I hold a PhD in Mathematical Modelling and my research interest covers various aspects of Applied Mathematics as Control Theory and Inverse Problems, Optimal Control Problems, and Numerical and Discrete Analysis for Partial Differential Equations (PDE) and Non-local Differential Equations (NDE).

Current and Recent Academic Position

Since 2024 **Teaching and Research Professor**, *Faculty of Engineering, Department of Mechanics, Design and Industrial Organization, University of Deusto, Bilbao, Basque Country, Spain*

2023 - 2024 **Associate Professor**, *Faculty of Science, Mathematics and Computer Science Department, University of Santiago of Chile, Chile*

2019 - 2023 **Assistant Professor**, *Faculty of Science, Mathematics and Computer Science Department, University of Santiago of Chile, Chile*

Education

11/2016 **PhD in Engineering Sciences, Mention in Mathematical Modeling**, *University of Chile, Chile*, Advisor: Dr. Jaime Ortega Palma
Thesis: *Problemas Inversos y Controlabilidad en Modelos de la Mecánica de Fluidos*

11/2011 **Mathematical Engineering Degree**, *University of Santiago of Chile, Chile*, Advisor: Dr. Hernán Henríquez Miranda
Thesis: *Estabilización de sistemas de control lineales abstractos de tipo neutro*

3/2010 **Bachelor in Mathematics**, *University of Santiago of Chile, Chile*

Grants and Awards

2023 - 2024 **Principal investigator**, *Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*
Humboldt Research Fellowship for Experienced Researchers - Alexander von Humboldt Foundation

2019 - 2022 **Principal investigator**, *Faculty of Science, Mathematics and Computer Science Department, University of Santiago of Chile, Chile*
ANID-PAI Convocatoria Nacional Subvención a la Instalación en la Academia año 2019 Grant Nº PAI77190106

2018 - 2021 **Principal investigator**, *Faculty of Science, Mathematics and Computer Science Department, University of Santiago of Chile, Chile*
Postdoctoral FONDECYT Grant Nº 3180322

2017 **Postdoctoral fellow**, *Faculty of Science, Mathematics and Computer Science Department, University of Santiago of Chile, Chile*
Dicyt-USACH Grant Nº 041633LY-POSTDOC

2012 - 2016 **PhD fellow**, *Mathematical Engineering Department, University of Chile, Chile*
PhD scholarship CONICYT-Nacional 2012 Nº21120662

Publications

Published/Accepted

15 **H. Antil, U. Biccari, R. Ponce, M. Warma, and S. Zamorano**, *Controllability properties from the exterior under positivity constraints for a 1–D fractional heat equation*, Evol. Eq. Control Th. 13(3), 893–924 (2024)

14 **R. Lecaros, R. Morales, A. Pérez, and S. Zamorano**, *Discrete Carleman estimates and application to controllability for a fully-discrete parabolic operator with dynamic boundary conditions*, Journal of Differential Equations 25, 832–881 (2023)

13 **C. Lizama. and S. Zamorano**, *Boundary controllability for the 1D Moore–Gibson–Thompson equation*, Meccanica 58, 1031–1038 (2023)

12 **M. Hernández, R. Lecaros, and S. Zamorano**, *Averaged turnpike property for differential equations with random constant coefficients*, Math. Control Relat. Fields 13(2), 808–832 (2023)

11 **R. Arancibia, R. Lecaros, A. Mercado and S. Zamorano**, *An inverse problem for Moore–Gibson–Thompson equation arising in high intensity ultrasound*, J. Inverse Ill-Posed Probl. 30(5), 659–675 (2022)

10 **C. Lizama, M. Warma, and S. Zamorano**, *Exterior controllability properties for a fractional Moore-Gibson-Thompson equation*, Frac. Calc. Appl. Anal. 25, 887–923 (2022)

9 **S. Zamorano**, *Approximate controllability from the exterior for a nonlocal Sobolev–Galpern type equation*, Math. Notes 110(4), 609–622 (2021)

8 **M. Warma and S. Zamorano**, *Exponential turnpike property for fractional parabolic equations with non–zero exterior data*, ESAIM Control Optim. Calc. Var. (Special issue in the honor of Enrique Zuazua's 60th birthday) 27(1) (2021)

7 **R. Lecaros, J. C. López, J. H. Ortega, and S. Zamorano**, *The stability for an inverse problem of bottom recovering in water-waves*, Inverse Problems 36(11) (2020)

6 **M. Warma and S. Zamorano**, *Analysis of the controllability from the exterior of strong damping nonlocal wave equation*, ESAIM Control Optim. Calc. Var. 26(41) (2020)

5 **M. Warma and S. Zamorano**, *Null controllability from the exterior of a one-dimensional nonlocal heat equation*, Control and Cybernetics 48(3), 417-436 (2019)

4 **C. Lizama. and S. Zamorano**, *Controllability results for the Moore–Gibson–Thompson equation arising in nonlinear acoustics*, Journal of Differential Equations 266, 7813–7843 (2019)

3 **S. Zamorano**, *Turnpike property for two-dimensional Navier-Stokes equations*, Journal of Mathematical Fluid Mechanics 20(3) 869–888 (2018)

2 **E. Beretta, C. Cavaterra, J.H. Ortega, and S. Zamorano**, *Size estimates of an obstacle in a stationary Stokes fluid*, Inverse Problems, 33(2) (2017)

1 **S. Zamorano and H. Henríquez**, *Feedback stabilization of abstract neutral linear control systems*, Math. Control Signals Syst. 25:345–386 (2013)

Submitted

1 **S. Zamorano**, *Almost periodic turnpike phenomenon for time-dependent systems*, Submitted (2024)

2 **M. Hernández, M. Lazar, and S. Zamorano**, *Averaged observation and turnpike phenomenon for parameter-dependent systems*, Submitted (2024)

3 **S. Zamorano and E. Zuazua**, *Tracking controllability for finite-dimensional linear systems*, Submitted (2024)

In Preparation

1 **J, Apraiz, R. Lecaros and S. Zamorano**, *General stability result for an inverse problem for Moore–Gibson–Thompson equation*

2 **U. Biccari, J.P. Borthagaray, S. Zamorano, and E. Zuazua**, *Adjoint formulation for the fractional exterior control problem*

3 **V. Hernández-Santamaría, R. Lecaros, A. Pérez, and S. Zamorano**, *Carleman estimates and controllability for a fully-discrete fourth-order parabolic equation*

4 **P. Márquez, S. Zamorano, and E. Zuazua**, *Controllability results for the viscous van Wijngaarden–Eringen equation*

5 **G. García, J. Vidal, and S. Zamorano**, *Inverse source problem for fractional heat equation: reconstruction formula*

Research Visits

11/2021 - 1/2022 **Research stay**, *Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*
Research stay with Professor Dr. Enrique Zuazua Iriondo

9/2019 - 10/2019 **Research stay**, *University of Deusto, Bilbao, Basque Country, Spain*
Research stay with Professor Dr. Enrique Zuazua Iriondo

9/2018 - 10/2018 **Research stay**, *University of Puerto Rico, San Juan, Puerto Rico*
Research stay with Professor Dr. Mahamadi Warma

3/2015 - 1/2016 **Research stay**, *Basque Center for Applied Mathematics, Bilbao, Basque Country, Spain*
Research stay with Professor Dr. Enrique Zuazua Iriondo

Organization of Scientific Events

6/2024 **Organizing Committee on Trends in Mathematical Sciences**, *Friedrich-Alexander Universität Erlangen-Nürnberg, Erlangen, Germany*
Web Page of Workshop

8/2022 **Organizer Thematic session Control, inverse problems and beyond – IX Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Web Page of Workshop

11/2021 **Organizing Committee on Workshop on Nonlinear Analysis and Control Theory in honor of Professor Enrique Zuazua for his 60th birthday**, *University of Chile and University of Santiago of Chile, Santiago, Chile*
Web Page of Workshop

10/2021 **Organizing Committee on XIV Congress GAFEVOL – A Conference in Honor of Carlos Lizama on the Occasion of his 60th Birthday**, *University of Santiago of Chile, Santiago, Chile*
Web Page of Group

8/2019 **Organizer Thematic session on Nonlocal PDE and control – VII Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Web Page of Workshop

8/2019 **Organizer Thematic session Young researchers – VII Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Web Page of Workshop

2019 **Organizer Research Seminar GAFEVOL – Evolution Equations and Functional Analysis Group**, *University of Santiago of Chile, Santiago, Chile*
Web Page of Group

11/2018 **Organizing Committee on XII Congress GAFEVOL 2018 – Evolution Equations and Functional Analysis**, *University of Santiago of Chile, Santiago, Chile*
Web Page of Group

Upcoming and Recent Talks

8/2022 **IX Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Web Page of Conference

7/2022 **Congreso de Ecuaciones Diferenciales y Aplicaciones - CEDYA 2022**, *Universidad de Zaragoza, Zaragoza, Spain*
Web Page of Conference

9/2021 **Congreso Latinoamericano de Matemáticos - CLAM 2021**, *Universidad de la República del Uruguay, Montevideo, Uruguay*
Web Page of Conference

8/2021 **Conference on System Modelling and Optimization - IFIP TC7**, *Escuela Politécnica Nacional, Quito, Ecuador*
Web Page of Conference

4/2021 **XXXIII Jornada de Matemática de la Zona Sur**, *Universidad de la Frontera, Temuco, Chile*
Web Page of Conference

11/2019 **French Latin–American Conference on New Trends in Applied Mathematics - FLACAM 2019**, *University of Chile, Santiago, Chile*
Title: Null controllability from the exterior of a one-dimensional nonlocal heat equation
Web Page of Conference

9/2019 **European Numerical Mathematics and Advanced Applications Conference 2019 - ENUMATH 2019**, *Egmond aan Zee, Holland*
Title: Controllability results for the Moore-Gibson-Thompson equation arising in nonlinear acoustic
Web Page of Conference

8/2019 **VII Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Title: Exterior control problem of strong damped nonlocal wave equation and nonlocal heat equation
Web Page of Workshop

8/2019 **VII Partial Differential Equations, Optimal Design and Numerics**, *Centro de Ciencias de Benasque Pedro Pascual, Benasque, Spain*
Title: Turnpike property for 2 and 3–D Navier–Stokes systems
Web Page of Workshop

6/2019 **Coloquio IMAFI**, *Instituto de Matemática y Física, Universidad de Talca, Talca, Chile*
Title: Analysis of the controllability from the exterior of strong damping nonlocal wave equation
Web Page of Coloquio

12/2018 **Workshop on Inverse and Control Problems for Physical Systems**, *Universidad Técnica Federico Santa María, Valparaíso, Chile*
Title: Analysis of the controllability from the exterior of strong damping nonlocal wave equation
Web Page of Workshop

11/2018 **III Workshop de Ciencia**, *University of Santiago of Chile, Santiago, Chile*
Title: Controllability of PDE: moving control
Web Page of Workshop

Evaluation Committees

Graduate Level

1/2022 **Donato Vásquez**, *Universidad de Chile and Universidad de Sevilla*, PhD. in Engineering Sciences, Mention in Mathematical Modeling, Advisers: Dr. Carlos Conca (U. de Chile) and Dr. Juan Casado Díaz (U. de Sevilla)

5/2021 **Silvia Rueda**, *Universidad de Santiago de Chile, Santiago, Chile*, PhD. in Mathematics, Advisor: Dr. Carlos Lizama

8/2020 **Hugo Parada**, *Universidad Técnica Federico Santa María, Valparaíso, Chile*, M. Sc. in Mathematics, Advisors: Dr. Eduardo Cerpa and Dr. Patricio Guzmán

8/2020 **Jorge González**, *Universidad de Santiago de Chile, Santiago, Chile*, PhD. in Mathematics, Advisor: Dr. Carlos Lizama

12/2018 **Jennifer Bravo**, *Universidad de Santiago de Chile, Santiago, Chile*, M. Sc. in Mathematics, Advisor: Dr. Carlos Lizama

Undergraduate Level

4/2024 **Christian Jorquera**, *Universidad de Santiago de Chile, Santiago, Chile*, Mathematical Engineering, Advisor: Dr. Leonardo Videla

9/2022 **Camila Molina**, *Universidad de Santiago de Chile, Santiago, Chile*, Mathematical Engineering, Advisor: Dr. Carlos Lizama

5/2023 **Fabrizzio Verdugo**, *Universidad de Santiago de Chile, Santiago, Chile*, Mathematical Engineering, Advisor: Dr. Oscar Rojas

Peer Reviewer

Since 2018 Referee for articles in various journals: Boletín de la Sociedad Matemática Mexicana; Mathematical Control and Related Fields; Vietnam Journal of Mathematics; Journal of Dynamics and Differential Equations; Boundary Value Problems; Acta Applicandae Mathematicae; Optimization; SIAM Journal on Control and Optimization; Nonlinearity; Fractional Differential Calculus; AIMS Mathematics; Advances in Continuous and Discrete Models; Numerical Algebra, Control and Optimization; Nonlinear Analysis: Real World Applications; Inverse Problems; IET Control Theory and Applications; Journal of Differential Equations; IMA Journal of Mathematical Control and Information; among others

Since 2019 Reviewer of the American Mathematical Society

Teaching Experience at University of Deusto

Undergraduate Courses in Mathematical Engineering

- Fundamentals of Algebra (2024/1)
- Probability (2024/2)

Undergraduate Courses in Engineering and Sciences

- Differential Equations (2024/1)
- Calculus I (2024/2)

Teaching Experience at University of Santiago of Chile

Undergraduate Courses in Mathematical Engineering

- Algebra I (2018/1, 2019/1, 2020/1, 2022/1, 2023/1)
- Calculus I (2017/2)
- Introduction to Engineering (2017/2, 2018/2, 2020/2, 2022/2)
- Topology (2021/1)
- Functional Analysis (2021/1)
- Complex Analysis (2016/2)
- Probabilities (2013/2, 2016/2)
- Seminar on Control of Partial Differential Equations (2018/2, 2020/2, 2022/2)
- Seminar on Analysis and Applications of the Navier-Stokes equations (2016/2)
- Seminar on Controllability and Optimal Control (2014/2)
- Seminar on Sobolev spaces and applications (2013/2)

Undergraduate Courses in Engineering and Sciences

- Differential Equations and Numerical Methods (2021/1, 2022/1, 2023/1)
- Algebra I (2017/2)

- Calculus I (2010/1, 2011/1, 2012/1, 2013/1)
- Calculus II (2010/2, 2011/2, 2012/2, 2013/2)

Graduate Courses in Master in Mathematics

- Topology (2021/1)
- Seminar on Control of Partial Differential Equations (2018/2)
- Seminar on Sobolev spaces and applications (2013/2)

Books Apuntes de Teoría de Control: Download here or visit my web-page.

Teaching Experience in Other Universities

Undergraduate Courses in University of Chile

- Differential and Integral Calculus (2016/2, 2017/1, 2017/2)
- Ordinary differential equations (2017/2)
- Probabilities and Statistics (2014/2, 2016/2)
- Mathematics III (2017/2, 2018/2)

Undergraduate Courses in Adolfo Ibáñez University

- Linear Algebra (2016/2)
- Ordinary differential equations (2016/2)
- Calculus II (2016/1)
- Probability Theory (2014/2)
- Applied Statistics (2014/2)
- Analytical Geometry and Introduction to Calculus (2014/1)

Thesis Advising

Post-doctoral Positions Supervised

2022 - 2023 **Dr. Ariel Pérez**, *PhD. in Engineering Sciences, Mention in Mathematical Modeling, Universidad de Chile*
Funded by Postdoc-DICYT Grant 042332ZA VRIIC - Universidad de Santiago de Chile

Graduate Level

8/2022 **Rogelio Arancibia**, *Universidad Técnica Federico Santa María, Valparaíso, Chile*, M. Sc. Mathematics, Title: An inverse problem for the Moore–Gibson–Thompson equation
Co-direction with Dr. Rodrigo Lecaros

4/2021 **Martín Hernández**, *Universidad Técnica Federico Santa María, Valparaíso, Chile*, M. Sc. Mathematics, Title: Turnpike under uncertainty
Co-direction with Dr. Rodrigo Lecaros

Undergraduate Level

8/2024 **Joaquín Vidal**, *Universidad de Santiago de Chile*, Mathematical Engineering, Title: Una fórmula de reconstrucción de una fuente en la ecuación de calor no local a partir de mediciones internas utilizando una familia de controles nulos
Co-direction with Dr. Galina García

4/2024 **Kevin Díaz**, *Universidad de Santiago de Chile*, Mathematical Engineering, Title: Controlabilidad desde el exterior de la ecuación viscosa de van Wijngaarden–Eringen no-local

8/2021 **Yaritza Dinamarca**, *Universidad de Santiago de Chile*, Mathematical Engineering, Title: Control frontera de un modelo de viscoelasticidad
Co-direction with Dr. Galina García

8/2021 **Pablo Márquez**, *Universidad de Santiago de Chile*, Mathematical Engineering, Title: Controlabilidad de la ecuación viscosa de van Wijngaarden–Eringen
Co-direction with Dr. Galina García

1/2018 **Juan José Maulén**, *Universidad de Santiago de Chile*, Mathematical Engineering, Title: Problema de optimización de forma finito–dimensional en largos intervalos de tiempo: propiedad de turnpike

Administrative academic activities

Since 6/2023 **Faculty Counselor**, *Faculty of Science, University of Santiago of Chile, Chile*

Since 3/2021 **Mathematical Engineering Committee Member**, *Mathematics and Computer Science Department, Faculty of Science, University of Santiago of Chile, Chile*

2021 - 2023 **Faculty Member of "Consejo Asesor Vinculación con el Medio"**, *Faculty of Science, University of Santiago of Chile, Chile*

Other background

2011 - 2012 **Staff**, *Financial Services Office, Risk and Compliance Services, Ersnt & Young Santiago*