Alonso Javier Bustos Barría[1]

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Date of birth: 19 February 2002 *Nationality:* Chilean

Education

2020 – 2025	Mathematical Civil Engineering, Universidad de Concepción, Chile.
2020 – 2024	Bachelor of Sciences in Engineering Mathematics, Universidad de Concepción, Chile.

Scholarships and prizes

2020	Universidad de Concepción scholarship for best national score in University Selection Test of mathematics.
2020	Mathematical engineering scholarship for the best 10 applicants to Mathematical Engineering at Universidad de Concepción.
2019	Awarded for achieving the highest national score in mathematics in the Chilean University Selection Test (PSU).

Academic Experience

2026	**Research Assistant**, GIANuC^2, Universidad Católica de la Santísima Concepción and CMM: PIA Program FB210005, under the supervision of Professor Sergio Caucao.
2025	**Thesis student of Mathematical Civil Engineering**, Universidad de Concepción, under the supervision of Professor Sergio Caucao, supported by Fondecyt Project No. 1250937, "Numerical Analysis of Nonlinear Single and Coupled Problems with Biomedical and Geoscience Applications." The thesis is entitled "*A Banach Space Mixed Formulation for the Unsteady Brinkman Problem with Spatially Varying Porosity.*"
	Research Stay, George Mason University, Fairfax, Virginia, USA: A two-month research stay in February and March under the supervision of Professor Harbir Antil. The main goal was to investigate topics related to Risk measures and Rockafellians in the context of PDE-constrained optimization under uncertainty.

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[1]Latest update: March 10, 2026

2024   **Research Assistant**, CI²MA and UNIVERSIDAD DEL BÍO-BÍO: Anillo of Computational Mathematics for Desalination Processes, Código ACT210087, under the supervision of Professor Gabriel N. Gatica. In particular, among other tasks, I collaborated closely with Russel Demos, a PhD student from Monash University, during his three-month research stay at Universidad de Concepción.

         Research Internship, UNIVERSIDAD CATÓLICA DE LA SANTÍSIMA CONCEPCIÓN: Fondecyt Project No. 11220393, *"Finite Element Methods for Brinkman—Forchheimer and Related Problems"*, under the supervision of Professor Sergio Caucao.

Publications

1. A. J. BUSTOS, S. CAUCAO, G. N. GATICA, B. N. VENEGAS. *New fully mixed finite element methods for the coupled convective Brinkman–Forchheimer and nonlinear transport equations.* J. Sci. Comput. 104, Paper No. 64, 45 pp. (2025). (Available here).

2. A. J. BUSTOS, S. CAUCAO, G. N. GATICA. *Mixed-primal and fully-mixed formulations for the convection-diffusion-reaction system based upon Brinkman–Forchheimer equations.* Comput. Math. Appl., vol. 207, pp. 222-249, (2026). (Available here).

3. A. J. BUSTOS, S. CAUCAO. *A Banach space mixed formulation for the unsteady Brinkman problem with spatially varying porosity.* Preprint, 2025. (Preprint available here).

4. A. J. BUSTOS, G. N. GATICA, R. RUIZ-BAIER, B. N. VENEGAS. *A perturbed threefold saddle-point formulation yielding new mixed finite element methods for poroelasticity with reduced symmetry.* Preprint, 2026. (Preprint available here).

5. H. ANTIL, A. J. BUSTOS, S. P. CARNEY, B. N. VENEGAS. *Rockafellian Relaxation for PDE-Constrained Optimization under Uncertainty in the context of Risk Measures.* In Preparation.

6. A. J. BUSTOS AND S. CAUCAO. *A posteriori error analysis of two mixed formulations for a coupled Brinkman–Forchheimer and convection-diffusion-reaction system.* In Preparation.

Teaching Experience

2026   **Part-Time teacher**, UNIVERSIDAD DEL BÍO-BÍO: Linear Algebra, and Algebra for engineering.

         Student Assistant, UNIVERSIDAD CATÓLICA DE LA SANTÍSIMA CONCEPCIÓN: Calculus I and Mathematical Foundations I.

2025   **Student Assistant**, Universidad de Concepción: Functional analysis I, and Mixed Finite Element Methods.

2024   **Student Assistant**, Universidad de Concepción: Functional Analysis I and Mathematical Thinking for Mathematical Engineering students. Ordinary Differential equations for engineering students.

       Course Tutoring of Real Analysis I for mathematical engineering students.

2023   **Student Assistant**, Universidad de Concepción: Ordinary Differential Equations, Numerical Analysis I and Complemento de Cálculo (Complex Analysis and Partial Differential Equations) for engineering students. Algebra III: Foundations and Linear Algebra II for Mathematical Engineering students. Discrete Mathematics for Mathematics Pedagogy students.

2022   **Student Assistant**, Universidad de Concepción: Calculus I, Algebra II and Numerical Analysis I for Engineering students.

       Course Tutoring of Calculus IV for Mathematical Engineering students.

2021   **Student Assistant**, Universidad de Concepción: Algebra I, Algebra II and Calculus I for Engineering students.

Talks

2025   Talca Numérica I, at the Universidad Católica del Maule. *Banach Space Mixed Formulations for the Convection-Diffusion-Reaction System Based upon Brinkman–Forchheimer Equations.*

2025   Seminar on Numerical Analysis and Mathematical Modeling at the Centro de Investigación en Ingeniería Matemática (CI^{2}MA). *Rockafellian Relaxation for PDE-Constrained Optimization under Uncertainty in the Context of Risk Measures.*

2025   Meeting of the Chilean Mathematical Society (SOMACHI), Vicuña, Chile. *A Banach Space Mixed Formulation for the Unsteady Brinkman Problem with Spatially Varying Porosity.*

Conferences and Workshops attended

2025   Meeting of the Chilean Mathematical Society (SOMACHI).

2025   Talca Numérica I (at the Universidad Católica del Maule).

2024   Jornada Matemática de la Zona Sur (at the Universidad Católica de Temuco).

2024   Workshop on Numerical Analysis of Partial Differential Equations (WONAPDE 2024).

2022   Encuentro Nacional en Ingeniería Matemática (ENIM 2022).

Computer Skills

Programming Languages	Python
Mathematical Software/Libraries	MATLAB, FEniCS, FreeFem++, NGSolve

Languages

Spanish	Native
English	Intermediate (B2)

Other Activities

2025	Member of the Organizing Committee of the *Encuentro Nacional de Ingeniería Matemática 2025* (National Meeting of Mathematical Engineering).
2024	Co-organizer of *Seminario de Análisis Numérico y Modelación Matemática* (Seminar on Numerical Analysis and Mathematical Modeling) at CI^{2}MA, Concepción, Chile.
2024	Member of Election Qualifying Court of Mathematical Engineering at Universidad de Concepción.