Gastón Vergara-Hermosilla

Curriculum Vitae

Centre for Ocean Energy Research
National University of Ireland, Maynooth
Dublin, Ireland
☎ *+353 871138105*
✉ *gaston.vergarahermosilla.2022@mumail.ie*
www.sites.google.com/view/gastonvh

I defended my PhD in Applied Mathematics in October 2021, under the supervision of Franck Sueur and Marius Tucsnak at Université de Bordeaux, France. My PhD research project was funding from the European Union's Horizon 2020 research and innovation programme under the Marie Sklodowska-Curie grant agreement No 765579. Since July 2021, I have been a visiting professor at the Department of Mathematics and Physics of the Catholic University of Temuco, Chile. On the other hand, since September 2021, I have been a early stage researcher in the Centre for Ocean Energy Research Electronic Engineering under the supervision mentored by John Ringwood and Nicolas Faedo (from Politecnico di Torino, Italy) at the National University of Ireland, Maynooth, Ireland. My research project has received funding from the Science Foundations Ireland (SFI) under grant No 12/RC-PhD/3486 for MaREI, the SFI research centre for energy, climate and marine research and innovation.

Research Interests

- Control, Analysis and Numerics of PDEs: Hyperbolic PDEs and Conservation Laws, Fluid-Structure Interactions Models, Non-linear Equations from Fluid Mechanics, Waves and Dispersive PDEs.
- Statistics methods of machine learning and neural networks and its applications on hydrodynamic control of wave energy converters and epidemiology, with emphasis in the currently pandemic situation of COVID-19.

Employments

From Sept. 2021 **Early stage researcher**, *Centre of Ocean Energy Research, National University of Ireland*, Maynooth, Ireland.
Research topic: *Estimation and forecasting in wave energy systems using the moment domain.*

From July 2021 **Visiting professor**, *Department of Mathematical and Physical Sciences*, Catholic University of Temuco, Chile.

Nov. 2018 to Aug. 2021 **Ph.D. researcher at ConFlex project**, *hosted by the Institut de Mathématiques de Bordeaux*, Université de Bordeaux, France.
Research topic: *Analysis and control of fluid-structure interactions.*

Education

Oct. 2021 **Ph.D. in Applied Mathematics**, *Université de Bordeaux*, Bordeaux, France.
Ph.D. Dissertation: *Modelling, analysis and control of some water waves-rigid body interactions.*
Supervisors: Marius Tucsnak and Franck Sueur.

Sept. 2018 **Master Degree in Applied Mathematics**, *Catholic University of Temuco*, Chile.
Master Dissertation: *Approximation of Fractional Derivatives by Orthogonal Moments.*
Supervisor: Stefan Berres.

Apr. 2016 **Bachelor Degree in Mathematics**, *University of Valparaíso*, Valparaiso, Chile.
Bachelor Dissertation: *Imaginary Quadratic Fields with Number Class 2.*
Supervisor: Amalia Pizarro-Madariaga.

Grants and Projects

From 2018 **CONFLEX Consortium**, early stage researcher in the project "control of flexible structures and fluid structure interaction" funded by the H2020-MSCA-ITN programme.

2018 **Biomatica Project**, member of the project "Análisis de Continuación Angiogénesis" funded by VIP Catholic University of Temuco, Chile.

2017 - 2018 **Master Scholarship**, granted by Catholic University of Temuco, Chile.

2013 - 2016 **Bachelor Scholarship**, granted by Ministry of Education of the Government of Chile.

Research Papers

2021 **Boundary controllability of a system modelling a partially immersed obstacle**, *with G. Leugering and Y. Wang*, Published in ESAIM: COCV 27 (2021) 80.

2021 **Well-posedness of an oscillating water column in shallow water with time-dependent air pressure**, *with E. Bocchi and J. He*, Submitted to the Journal of Differential Equations, preprint hal-03207105.

2020 **Asymptotic behaviour of a system modelling rigid structures floating in a viscous fluid**, *with D. Matignon and M. Tucsnak*, Published in IFAC-PapersOnLine 54 (9), 205-212, preprint hal-02475583.

2020 **On a dual to the properties of Hurwitz polynomials I**, *Published in American Journal of Computational Mathematics 11 (01), 31*, preprint hal-02519924.

2020 **Relations between fractional calculus and interactions**, preprint hal-02506981.

2020 **On the dynamics of the Coronavirus epidemic and the unreported cases: the Chilean case**, *with A. Navas*, preprint arxiv.org/pdf/2006.02632.

2020 **Extension and implementation of a system modelling the COVID-19 pandemic in Chile**, *with A. Navas*, preprint doi.org/10.1101/2020.06.21.20136606.

2019 **Well-posedness and input-output stability for a system modelling rigid structures floating in a viscous fluid** , *with D. Matignon and M. Tucsnak*, Published in IFAC-PapersOnLine 53 (2), 7491-7496, preprint hal-02475576.

2019 **Modelling and simulation of a wave energy converter**, *with E. Bocchi and J. He*, Published in ESAIM: Proceedings and Surveys 70, 68-83, preprint hal-02475536.

In progress **Uniqueness and large-time optimal control of an obstacle-mass constraint problem for scalar hyperbolic conservation laws**, *with E. Zuazua*.

Recently submitted **Understanding the dynamics of unreported cases with a socio-temporal dependent transmission rate in the COVID-19 pandemic in Santiago, Chile**, *with Y. Jiang*.

In progress **Serrin Criterion in Lebesgue spaces of variable exponents**, *with D. Chamorro*.

Research Papers in Spanish

2020 **Observaciones sobre la dinamica de la epidemia de Coronavirus y los casos no reportados: el caso de Chile**, *with A. Navas*, Published on the webpage of VIME of the University of Santiago of Chile, Preprint available on the website: www.mat.usach.cl/images/Profesores/navas-papers/covito.pdf.

2020 **Estimacion de casos no reportados de infectados de COVID-19 en Chile, el Maule y la Araucana durante marzo de 2020**, *with M. Candia*, Not intended for publication in a journal, preprint hal-02560526w.

2018 **Aproximacion numerica de derivadas fraccionarias por polinomios ortogonales**, *with S. Berres*, Published on the proceedings of the Mathematical Meeting of Sud Zone, Chile.

Research Visits

July 2019 **CIRM, Marseille, France**, *Geophysical Fluids, Gravity Flows - CEMRACS19*.

January 2020 **ISAE-SUPAERO, Université de Toulouse, France**, *Invited by D. Matignon*.

Jul.-Sep.2020 **Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany**, *Invited by Günter Leugering*.

Oct.-De.2020 **Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany**, *Invited by Enrique Zuazua*.

July 2021 **Université Paris-Saclay, Paris, France**, *Invited by Diego Chamorro*.

Communications in Conferences, Workshops and Seminars

Oct. 2021 **Some ideas to obtain energy in LatinAmerica**, *VII ConMatE-P*, Paris, France, talk.

Oct. 2021 **On shallow water equations and wave energy converters**, *Seminar of the EDP teams, IMB - Université de Bordeaux*, France, talk.

Aug. 2021 **Asymptotic behaviour of a system modelling rigid structures floating in a viscous fluid**, *MTNS20, University of Cambridge*, United Kingdom, talk.

Aug. 2021 **Some Remarks on Fluid-Structure Interactions**, *Fourth Network meeting ConFlex*, Lacanau, France, talk.

July 2021 **Some ideas about water waves-rigid body interactions**, *Seminar of Centre for Ocean Energy Research, Maynooth, Ireland*, talk.

June 2021 **Boundary controllability of a system modelling a partially immersed obstacle**, *Congrès SMAI 2021, Montpellier, France*, talk.

May 2021 **Understanding a basic example of Garside theory**, *PhD seminar, Department of Engineering Mathematics, University of Chile*, talk on line.

April 2021 **Mathematics, beyond publications**, *Lambda Seminar, Université de Bordeaux, France*, talk on line.

Feb. 2021 **Oscillating water columns in a shallow water regime: modelling, control and simulations**, *Mini-Symposium "Mathematical Modelling, simulation and control of water surface waves in technical marine applications",Erlangen, Germany and Busan, South Korea*, talk on line.

Dec. 2020 **Modelling and control of an OWC**, *Congrès d'Analyse Numérique pour les Jeunes - 2020*, talk on line.

October 2020 **Long time behaviour of a system modelling rigid structures floating in a viscous fluid**, *Mini-Workshop on Hyperbolic Problems, Friedrich-Alexander-Universität Erlangen-Nürnberg, Germany*, talk.

October 2020 **Some conclusion on fluid-structure interactions**, *VI Conferencia de Matemáticos Ecuatorianos ConMatE-P*, Institut Henri Poincaré, Paris, France, talk.

October 2020 **On the dynamics of the Coronavirus epidemic and the unreported cases: the Chilean case**, *I workshop, Master in Applied Mathematics*, UC Temuco, Chile, talk.

August 2020 **Asymptotic models with floating objects and applications**, *Group Applied Maths Seminar, Friedrich-Alexander-Universität Erlangen-Nürnberg*, Germany, talk.

August 2020 **On the dynamic of water waves with floating objects**, *Group Applied Maths Seminar, Friedrich-Alexander-Universität Erlangen-Nürnberg*, Germany, talk.

July 2020 **Well-Posedness and Input-Output Stability for a System Modelling Rigid Structures Floating**, *21st IFAC World Congress*, Berlin, Germany, talk.

July 2020 **Some Remarks on Fluid-Structure Interactions**, *Third Network meeting ConFlex*, Imperial London College, United Kingdom, talk on line.

July 2020 **Some Conclusions About a System Modelling Rigid Structures Floating in a Viscous Fluid**, *Lambda Seminar*, IMB, Bordeaux, France, talk.

Feb. 2020 **Some Conclusions About a System Modelling Rigid Structures Floating in a Viscous Fluid**, *Lambda Seminar*, IMB, Bordeaux, France, talk.

Jan. 2020 **Modelling and simulation of an OWC**, *Workshop on PDEs: Modelling, Analysis and Numerical Simulation*, Granada, Spain, poster.

Jan. 2020 **Modelling and Simulation of a Wave Energy Converter**, *Séminaire des doctorants du LAGA*, Université Sorbonne cite, Paris, France, talk.

Nov. 2019 **Input to State Stability for a System Modelling Rigid Structures Floating in a Viscous Fluid**, *PhD Aways Days Luxemburg-Bordeaux*, Bordeaux, France, talk.

August 2019 **Long-time Behaviour of a Model of Rigid Structure Floating in a Viscous Fluid**, *VII Partial differential equations, optimal design and numerics*, Benasque, Spain, talk.

August 2019 **Modelling and Simulation of a Wave Energy Converter**, *CEMRACS19, CIRM-Aix-Marseille Université*, France, talk.

July 2019 **Long-time Behaviour of a Model of Rigid Structure Floating in a Viscous Fluid**, *CEMRACS19, CIRM-Aix-Marseille Université*, France, talk.

June 2019 **Approach to the Equilibrium of a Model of Rigid Structure Floating in a Viscous Fluid**, *Lambda Seminar*, IMB, Bordeaux, France, talk.

Feb. 2019 **Control and identification for floating or immersed rigid bodies connected by deformable cables**, *Second Network meeting ConFlex*, Bilbao, Spain, talk.

Teaching Experience

2021 **Introduction to functional analysis**, *Lectures*, Master in Applied Mathematics, Catholic University of Temuco, Chile.

2018 **Linear algebra**, *Lectures and Tutorials*, Catholic University of Temuco, Chile.

2018 **Calculus II**, *Lectures and Tutorials*, Catholic University of Temuco, Chile.

2017 **Calculus I**, *Lectures and Tutorials*, Catholic University of Temuco, Chile.

2017 **Mathematics for Social Science**, *Lectures and Tutorials*, Catholic University of Temuco, Chile.

2016 **Linear algebra**, *Tutorials*, University Andres Bello, Viña del Mar, Chile.

Supervision of Students

2021 **Claudio Andrade**, *Master in Applied Mathematics*, University Catholic of Temuco, Chile.

Other Professional Activities

Event Organization

2019 **Ph.D. Students Seminar**, *IMB*, Bordeaux, France.

Nov. 2019 **PhD Away Days 2019 Luxemburg-Bordeaux**, *IMB*, Bordeaux, France.

Feb. 2021 **Latin American Athenaeum of Young Mathematicians**, DIM U. Chile - U. of Vienne - U. de Bordeaux, (on line).

May 2021 **Journée Ecole Doctorale de Mathématiques et Informatique EDMI 202**, Institut de Mathématiques de Bordeaux, Bordeaux, France, (on line).

June 2021 **One world meeting of young mathematicians in fluid dynamics**, U. de Sevilla - U. Paris-Saclay - U. de Bordeaux, (on line).

Service

2019 - 2021 **Vicepresident of the Ph.D. Students Associaton Lambda**, *IMB*, Bordeaux, France.

From Sep. 2020 **Referee for the Biophysical Journal**.

Skills

Languages

Spanish	*Mothertongue*
English	*Fluent*
French	*Intermediate*

Programs and Programming Languages

MatLab	*Advanced*
BOCOP	*Intermediate*
Python	*Intermediate*
C,JAVA	*Intermediate*