Emilio Jesús MOLINA OLIVARES
PhD. in applied mathematics
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 +33 0660289495   @ emiliomolina217@gmail.com   born on 21 November, 1991, Santiago de Chile

I am a postdoctoral researcher in Creatis, CNRS. My main interest as mathematician is the modeling and application of optimization and optimal control techniques to real world problems.

Research interest	Optimal control; nonlinear optimization; ordinary and partial differential equation models; model predictive control (MPC); problems applied to epidemiology, biology, privacy, magnetic resonance imaging (MRI).

🎓 EDUCATION

2022	Phd in Applied Mathematics, Sorbonne Université (Laboratoire Jacques-Louis Lions) and Universidad de Chile
2016	Master in Engineering Sciences mention Applied Mathematics, Universidad de Chile
2016	Mathematical Civil Engineering, Universidad de Chile

💼 PROFESSIONAL EXPERIENCE

Today
October 2023
Research postdoctal, CREATIS, CNRS, Lyon
main subject : Low Energy Optimal Radiofrequency Pulses for MRI
> Pulse optimization in magnetic resonance imaging using optimal control techniques..

September 2023
October 2022
Postdoctal researcher, GIPSA-LAB, UNIVERSITÉ GRENOBLE-ALPES, Grenoble
Main subject : Protecting privacy in mobile apps using predictive control and machine learning techniques
> State of the art in location privacy and study of the control and machine learning techniques applied to the problem. Modelling using model predictive control and optimal control techniques.

September 2022
March 2018
PhD in Applied Mathematics, SORBONNE UNIVERSITÉ, Paris
In co-direction with Universidad de Chile, Santiago
Subject : Optimal control techniques applied to natural systems management.
> Solving the Open Pit Mine Problem in the continuous framework.
> Peak minimization of infected individuals in epidemiology compartmental models.
> Evaluation of the vaccine program in Chile.

September 2018
January 2017
Project engineer, CENTER FOR MATHEMATICAL MODELING (CMM), Chile
Work in optimization and natural resources area
> Find velocity curves for trains minimizing energy consumption.
> Ship scheduling in Chilean ports.
> Crew scheduling for FCAB, railway company which transports mineral in the north of Chile.

January 2015
Engineering Internship, DELPHOS LAB, AMTC, Chile
> Subject : Ramps in open pit mine.

🏛 TEACHING EXPERIENCE

July 2022
March 2021
University teacher, FACULTAD DE CIENCIAS FÍSICAS Y MATEMÁTICAS, UNIVERSIDAD DE CHILE, Chile
Subject : Optimization
> Plenary class 3 h weekly, 15 weeks each semester.
> Make tests.
> Undergraduate level. Number of students : over 30.

December 2018 August 2017	University teacher, Universidad Nacional Andrés Bello, Chile Subjects : Linear Algebra and Numerical Calculus › Plenary class 4.5 h weekly, 15 weeks each semester. › Make tests. › Undergraduate level. Number of students : over 50.
December 2019 August 2012	Teacher assistant, Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Chile Several subjects, some of them : Optimal Control, Theory and Laboratory ; Mixed Integer Programming, Theory and Laboratory ; Nonlinear Optimization ; Calculus. › Weekly review and exercise classes, complementary to the plenary classes, 1.5 h weekly, 15 weeks each semester. › Undergraduate level, number of students : over 100. › Master level, number of students : over 20.
2015- Sporadic	Pedagogical Tools Maker, Center for Mathematical Modelling, Chile Develop pedagogical tools of B-Learning courses. Projects for the chilean Ministry of Education. UNESCO-Hamdan bin Rashid Al-Maktoum prize winners 2017-2018 for the project Suma y Sigue.

🌐 RESEARCH VISIT

May 2021 March 2022	MISTEA, INRAE, Supagro Montpellier, France
October 2024 December 2024	Deparamento de Matemáticas, Universidad Técnica Federico Santa Maria, CMM Valparaiso, Chile

📑 COLLECTIVE RESPONSIBILITIES

Reviewer
› Journal of Theoretical Biology.
› SIAM Journal on Applied Mathematics.
› Journal of Computational and Applied Mathematics.
› Journal of Biological Systems.
› Asian Journal of Control.
› IFAC conference.

Organisation
› Between March 2021 and September 2022, the PhD student seminar of the Department of Mathematical Engineering of the Universidad de Chile.
› Mini course : Numerical tools for optimal control problems. For students of Mathematical Engineering, Universidad Federico Santa María, November 2024.

☰ COMPETENCES

Optimization software and solvers	Ampl, Gurobi, Cplex, Ipopt, Casadi, Bocop
Programming	Matlab, Python (numpy, scipy, pandas, scikit-learn,matplotlib), R

🌐 LANGUAGES

Spanish ●●●●●
French ●●●●○
English ●●●○○

➕ STRENGTHS

› Independent
› Proactive
› Enthusiastic

🖵 PUBLICATIONS

Articles published in journals with peer-reviewed

APPLICATION OF A PREDICTIVE METHOD TO PROTECT PRIVACY OF MOBILITY DATA   2024
Molina, E., Fiacchini, M., Goarant, A., Raes, R., Cerf, S., and Robu, B.
🔗 Control Engineering Practice

OPTIMAL SYNTHESIS FOR A CLASS OF L^∞ OPTIMAL CONTROL PROBLEMS IN THE PLANE WITH L^1 CONSTRAINT ON THE INPUT   2024
Molina, E., Rapaport, A.
🔗 Optimization

REACT TO THE WORST : EFFICIENT AND PROACTIVE PROTECTION OF LOCATION PRIVACY   2023
Molina, E.„ Fiacchini, M., Cerf, S., Robu, B.
🔗 IEEE Control Systems Letters

OPTIMAL CONTROL APPROACHES FOR OPEN PIT PLANNING   2022
Molina, E., Martinon, P., Ramírez, H.
🔗 Optimization and Engineering

EQUIVALENT FORMULATIONS OF OPTIMAL CONTROL PROBLEMS WITH MAXIMUM COST AND APPLICATIONS   2022
Molina, E., Rapaport, A., Ramírez, H.
🔗 Journal of Optimization Theory and Applications

AN OPTIMAL FEEDBACK CONTROL THAT MINIMIZES THE EPIDEMIC PEAK IN THE SIR MODEL UNDER A BUDGET CONSTRAINT   2022
Molina, E., Rapaport, A.
🔗 Automatica

OPTIMALITY CONDITIONS FOR THE CONTINUOUS MODEL OF THE FINAL OPEN PIT PROBLEM   2019
Amaya, J., Hermosilla, C., Molina, E.
🔗 Optimization Letters

Articles published in conferences with peer-reviewed

OPTIMIZATION OF LOW AMPLITUDE RADIOFREQUENCY PULSES FOR SHORT T2 MRI
2024

Molina, E., Van Reeth, E., Ratiney, H.

⤤ Conference : ESMRMB anual meeting

ENHANCED BRAIN TISSUE CONTRAST IN MRI BY OPTIMAL CONTROL IN 3D DOUBLE INVERSION RECOVERY SEQUENCE WITH A VIEW TO IMPROVING
2024

Choquet, K., Van Reeth, E., **Molina, E.**, Delcey, M., Durand-Dubief, F, Ratiney, H.

⤤ Conference : ESMRMB anual meeting

OPTIMAL PRIVACY PROTECTION OF MOBILITY DATA : A PREDICTIVE APPROACH
2023

Molina, E., Fiacchini, M., Cerf, S., Robu, B.

⤤ IFAC World Congress

OPTIMIZATION MODEL FOR ROSTERING AND CREW ASSIGNMENT FOR TRAIN TRANSPORTATION
2019

Amaya, J., **Molina, E.**, Morales, N., Uribe, P.

⤤ Conference : Application of Computers and Operation Research in the Minery Industry (APCOM)

ANALYTICAL PROPERTIES OF THE FEASIBLE AND OPTIMAL PROFILES IN THE BINARY PROGRAMMING FORMULATION OF OPEN PIT
2017

Amaya, J., **Molina, E.**

⤤ Conference : Application of Computers and Operation Research in the Minery Industry (APCOM)

CHARACTERIZING THE OPTIMAL PROFILE OF THE OPEN PIT PROBLEM IN THE CONTINUOUS FRAMEWORK
2017

Amaya, J., **Molina, E.**

Conference : Application of Computers and Operation Research in the Minery Industry (APCOM)

Articles submitted or in preparation

MINIMIZING ENERGY AND POWER OF RADIOFREQUENCY PULSES IN MRI PROBLEMS
2024

Molina, E., Van Reeth, E.

In preparation

AN OPTIMAL CONTROL PROBLEM FOR ANTI-INFLAMMATORY TREATMENTS OF ALZHEIMER'S DISEASE
2024

Torres, N. **Molina, E.**, Pujo-Menjouet, L.

⤤ Submitted

IMPACT OF THE FIRST BOOSTER VACCINE AGAINST SARS-CoV-2 IN CHILE
2024

Molina, E., Olguin, D. Brault, A. Uribe, P. Gajardo, P., Canals, M. Ramírez, H.

⤤ Submitted

🖥 SCIENTIFIC PRESENTATIONS

SÉMINAIRE ANALYSE, PHÉNOMÈNES STOCHASTIQUES ET APPLICATIONS LMBA
JANUARY 2025

Brest, France

Speaker

SEMINARIO DE MATEMATICAS UNIVERSIDAD FEDERICO SANTA MARIA
NOVEMBER 2024

Valparaiso, Chili

Speaker

ENCUENTRO ENTRE LA ACADEMIA Y LA INDUSTRIA EN OPTIMIZACIÓN
NOVEMBER 2024

Valparaiso, Chili

Speaker

ESMRMB anual meeting   October 2024
Barcelone, Spain
Lightning talk and poster

Seminaire D'equipe AS2M, FEMTO-ST   May 2024
Online
Speaker

Seminaire D'equipe MAGICS, CREATIS   December 2023
Lyon, France
Speaker

IFAC World Conferece 2023   July 2023
Yokohama, Japan
Speaker

Séminaire du groupe PAD Gipsa Lab   March 2023
Grenoble, France
Speaker

Séminaire de mathemtiques Université d'Avignon   November 2023
Avignon, France
Speaker

PGMO days   November 2023
Palaiseau, France
Speaker

Euro conference on operation research   July 2022
Espoo, Finland
Speaker

9èmes Journées Franco-Chiliennes d'Optimisation   June 2022
Perpignan, France
Speaker

Workshop on Optimal Control Theory   June 2022
Rouen, France
Speaker

Seminaire des doctorantes Universidad de Chile CMM   June 2022
Santiago, Chile
Speaker

Groupe de Travail des Thésard(e)s du LJLL   March 2022
Paris, France
Speaker

Mathematical Congress of the Americas MCA   July 2021
Online
Speaker

Workshop STIC AmSud – NEMBICA   May 2021
Frejus, France
Speaker

Ateneo ALMA joven   January 2021
online
Speaker

Seminare equipe INRIA CAGE   May 2020
online
Speaker

Euro conference on operation research   July 2019
Dublin, Irlande
Speaker

Encuentro anual sociedad de matematica de Chile   November 2018
Santiago, Chile
Speaker

Encuentro latinoamerica de estudianes en modelamiendo, ingeniería y ciencias   October 2018
Santiago, Chile
Poster session

Euro conference on operation research

<div align="right">July 2018</div>

Valence, Espange
Speaker

Application of computer and operations research in the mneral industry (APCOM)

<div align="right">August 2017</div>

Golden, USA
Speaker