

MATEO TONATIUH RODRÍGUEZ CERVANTES

05/01/1992, Mexico City, Mexico

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EDUCATION

National Autonomous University of Mexico, UNAM, Mexico 2023
M.Sc. (Mathematics: Numerical analysis and scientific computing)
Institute of Applied Mathematics and Systems Research, IIMAS
Graduated with Honours
Overall Grade: 10/10

National Institute of Fine Arts and Literature, INBAL, Mexico 2020
(Certificate delayed until 2023 due to COVID emergency)
Bachelor of Arts in Musical Composition
School of Music
Overall Grade: 9.08/10

National Autonomous University of Mexico, UNAM, Mexico 2019
B.Sc. (Physics)
Faculty of Sciences
Overall Grade: 9.16/10

SKILLS

Programming skills (Julia, Python, MATLAB, R):

- Finite difference methods for PDEs-(Julia, Python MATLAB)
- Finite element methods for PDEs-(Julia, Python, MATLAB)
- Statistical analysis -(Julia, Python MATLAB, R)
- Machine learning-(Julia, Python MATLAB)
- Deep learning (Neural Networks)- (Python)

Modelling skills:

- Complex networks
- Dynamical systems: Ordinary differential equations, cellular automatas, agent-based models.
- Partial differential equations

WORK EXPERIENCE

Inter-American Development Bank (IDB), USA. 2023 - Present
Project: *Strengthening of Tax Management in Mexico City*
-Junior Research Programmer Consultant: Data repository development, integration of external databases, support in statistical learning model programming.

School of Government and Public Transformation,
Monterrey Institute of Technology (ITESM), Mexico City, Mexico,
in collaboration with the World Bank, USA. 2022 - Present

Project: *SISEPUEDE* (Simulating Sectoral Pathways and Uncertainty Exploration for Decarbonization), research programme on sustainability and decarbonization. <https://sisepuede.readthedocs.io/en/latest/index.html>
-Research Assistant: data analysis and calibration.

School of Government and Public Transformation,
Monterrey Institute of Technology (ITESM), Mexico City, Mexico *2022 - Present*
“*Productivity Space and State Industrial Evolution in Mexico*”,
a co-authored article about economic complexity in Mexico.
-Co-author with Edmundo Molina and Fernando Gomez, data analysis and modelling.

ACADEMIC PROJECTS

Cavendish Laboratory, Cambridge, UK *2023-Present*
-Developer of mathematical and numerical models.
Article: “*A unified description of organic thermoelectrics based on transport measurements in the non-degenerate and near-degenerate regimes*”
Project under development on the investigation of the dynamics of charge carriers in organic polymer semiconductors, through the study and implementation of nonlinear diffusion models. This is an ongoing collaboration with Dr. Deepak Venkateshvaran and Dr. Pablo Padilla Longoria.

Musical Acoustics Laboratory, Politecnico di Milano, Cremona, Italy *2023-Present*
-Research Assistant.
Article: “*Predicting the acoustics of archtop guitars using an AI-based algorithm trained on FEM simulations*”
This is an ongoing collaboration with Dr. Sebastian Gonzalez.

Cavendish Laboratory, Cambridge, UK, and
National Autonomous University of Mexico, UNAM, Mexico *2022-Present*
- Author
Master thesis: “*Micro-Tabla: Numerical Modelling of Non-homogeneous Plate Vibrations*” Supervisor: Dr. Pablo Padilla Longoria.
In this work, we develop a numerical model to simulate and analyse the vibrations of non-homogeneous damped circular polymer plates with microscopic dimensions. This analysis shows an improvement of the quality factor of the plates vibrations in certain loading regimes. These results can be used as manufacturing guidelines for micro- and nano-devices.
This project is the outcome of a research stay at the University of Cambridge during the Michaelmas term of 2022, under the supervision of Dr. Deepak Venkateshvaran. Currently, an ongoing collaboration with the University of Groningen seeks to build the loaded micro-plates and measure the corresponding results.

Fitzwilliam College, University of Cambridge, UK *2018 - Present*
-Research Assistant
Formal Methods in Musicology
<https://formal-methods-in-musicology.webnode.com/>
Project on musical style classification applying statistics, machine learning, network and information theory tools. Some publications include:

- “*Analysis, Attribution, and the Beatles*”, *2023*
published in *Journal of Beatles Studies*, Liverpool University Press.
-Co-author with Matthew Jones, Francis Knights and Pablo Padilla Longoria.

- “*Chronology, style and attribution in the early keyboard suites of J. S. Bach*”, 2023
published in *Studies on Authorship in Historical Keyboard Music*.
Book edited by Andrew Woolley. United Kingdom: Taylor and Francis.
-Co-author with Francis Knights, Pablo Padilla Longoria.
- “*O Splendor Gloriam: Taverner or Tye?*”, 2022
published in *Early Music*, Oxford Academic Press.
-Co-author with Francis Knights, Pablo Padilla Longoria.
- “*The Importance of Silence in Music Information Retrieval*”, 2020
published in *Computer Music Journal*, MIT Press.
-Main author with Pablo Padilla Longoria, Francis Knights and Dan Tidhar.

ACADEMIC EXPERIENCE

Exchanges

Cavendish Laboratory, Cambridge, UK 2022
Research Exchange
Conducted research on the vibrations of micro-scale polymer-loaded plates under the supervision of Dr. Deepak Venkateshvaran.

Centre for Music and Science, Faculty of Music, University of Cambridge, UK 2022
Academic Guest
Academic visitor and speaker at the CMS seminar, under the supervision of Dr. Peter Harrison.

Fitzwilliam College, University of Cambridge, UK 2018
Research stay,
Conducted research on musical style classification applying machine learning tools in the programme: Formal Methods in Musicology (<https://formal-methods-in-musicology.webnode.com/>), under the supervision of Dr. Francis Knights.

Conferences

Conference on Complex Systems (CCS) 2021, Lyon, France 2021
Speaker. Session 2.9: Transdisciplinary and Applied Complex Systems I
Rhythm and Form in Music: A Complex Systems Approach
A co-authored work with Blas Kolic, Pablo Padilla Longoria and Francis knights, on information and networks theory applied to the study of rhythm and structure in music.

Center for Complexity Sciences (C3), UNAM, Mexico 2020
Speaker at the *Interdisciplinary Encounter on Science, Sound, and Music*
“Beam Vibration Analysis Applied to the Baschet Sound Sculptures”
Presentation on numerical modelling of non-homogeneous beam vibrations and its significance in the design of musical instruments.

Faculty of Music, UNAM, Mexico 2018
Speaker at the *Seminar of Sciences and Music*
“Baschet Sound Sculpture Acoustic Analysis”
Presentation on the correlation between tuning, musical scales, and their connection to

the physical models of string vibrations, as well as the beam vibration physical model that influences the tuning and timbre of the *Baschet Sound Sculptures*..

Faculty of Sciences, UNAM, Mexico 2015

Speaker at the *4th Congress of the Contemporary Physics Laboratory*
“Langmuir Probe”

Presentation on an experimental study aimed at measuring the electron density within a plasma with a Langmuir Probe.

Teaching experience

Institute of Applied Mathematics and Systems Research, IIMAS, UNAM, Mexico 2022

Teaching assistant to Dr. Pablo Padilla Longoria, IIMAS, UNAM.

“Musical Acoustics Seminar” lecture in the Master in Mathematical Sciences.

Lecture on mathematical models in musical acoustics.

Faculty of Music, UNAM, Mexico 2019

Teaching assistant to Dr. Pablo Padilla Longoria, IIMAS, UNAM.

“Probability and Statistics for Musicians” lecture in the Master in Musical Cognition programme.

Probability and Statistics topics that are useful in cognitive studies research.

School of Music, INBAL, Mexico 2017

Substitute teacher to Carole Chargerou

“Electroacoustic Composition” class for *Musical Composition* students

Sound synthesis techniques using Super Collider software.

COURSES AND SEMINARS

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico 2023
Dr. Gibran Fuentes Pineda
Deep Learning
Enrollment Status: Auditor

Institute of Mathematics, IMATE,
National Autonomous University of Mexico, UNAM, Mexico 2023
Dr. Alberto Saldaña De Fuentes
Functional Analysis Applied to Partial Differential Equations
Enrollment Status: Auditor

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico 2023
Dr. Gibran Fuentes Pineda
Machine Learning
Enrollment Status: Auditor

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico 2023
Dr. Daniel Castañón Quiroz
Theory, Practice, and Applications of the Finite Elements

Enrollment Status: Auditor

Department of Applied Mathematics and Theoretical Physics,
University of Cambridge, UK *2022*
Professor Arieh Iserles
Numerical Solution of Differential Equations
Enrollment Status: Auditor

Faculty of Music,
University of Cambridge, UK *2022*
Dr. Richard Causton
Composers' Workshops
Enrollment Status: Auditor

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico *2022*
Dr. Mriganka Shekhar Chaki
An Introduction to the Propagation of Waves in Elastic Media
Enrollment Status: Auditor

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico *2022*
Dr. Nestor Abel Sánchez Goycochea
Introduction to the Finite Element Method
Enrollment Status: Auditor

Institute of Physics,
National Autonomous University of Mexico, UNAM, Mexico *2022*
Dr. Alejandro Perez Riascos
Stochastic Processes (Statistical Physics and Complex Systems)
Enrollment Status: Enrolled

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico *2022*
Dr. Yuriria Cortés Poza
Dynamic Systems Modeling and Simulation with a Complex Systems Approach
Enrollment Status: Enrolled

Institute of Mathematics, IMATE,
National Autonomous University of Mexico, UNAM, Mexico *2021*
Dr. Esteban Abelardo Hernández Vargas
Supervised Data Analysis
Enrollment Status: Enrolled

Institute of Applied Mathematics and Systems Research, IIMAS,
National Autonomous University of Mexico, UNAM, Mexico *2021*
Dr. Raffale Folino
Non-linear Hyperbolic Partial Differential Equations
Enrollment Status: Enrolled

Faculty of Sciences,

National Autonomous University of Mexico, UNAM, Mexico
Dra. Bibiana Obregón, Dr. Francisco Sevilla
Seminar on Networks and Complex Systems.
Enrollment Status: Enrolled

2021

LANGUAGES

Spanish: Native language

English: C1

ADDITIONAL SKILLS

Music composition and arrangement at professional level.
Classical and Popular guitar at professional level.