**AYRTON PABLO ALMADA JIMENEZ | Applied Mathematics Major**
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## About me

I am currently in the fourth year of my PhD in Applied Mathematics at the University of Arizona. My focus has been on mathematical modeling of power grid systems using probabilistic and statistical tools along with object oriented programming. I plan to continue my graduate studies to further pursue my interest in applying artificial intelligence, machine learning and operations research methods to data augmentation. I am particularly interested in natural language processing, diffusion models and large language models.

## Skills

- **Machine Learning & Data Science:** Supervised learning (classification & regression), Unsupervised learning (clustering, PCA), Natural Language Processing (sentiment analysis of financial news)
- **Statistical & Econometric Analysis:** Hypothesis testing and confidence interval estimation, Time-series modeling (ARIMA, GARCH), Regression analysis (linear, logistic, LASSO, Ridge)
- **Programming:** Proficient in Julia, Python, SQL and R. Elementary proficiency in Excel, Ruby, C and C++

## Internships

- **Computer Science Graduate Internship Program,** *Los Alamos National Lab*, New Mexico

  June 2023 - August 2023, January 2025 - Present
  - Developed a Julia based model of Electrical Power Grid dynamics for single discrete-time faults to test power system's resilience.
  - Examined and checked LANL' *System Agnostic Localization of Oscillations* (SALO) algorithm on small, medium and large power system models. Implemented a Julia based algorithm to efficiently process and test SALO's accuracy for large/dense models.
  - Built an R based visualization tool to process and render interactive dashboards used to interpret the collected data from SALO's output on large systems.
  - Developed a Julia/Python based engine *N1Plus* of Transmission Level Power Grid dynamics for multiple continuous-time faults. Built a dynamic yet analytically tractable framework for real-time security assessment to ensure system's safety and reliability.
  - Validated *N1Plus* on multiple models each with 100,000 scenarios in sub-second times. Achieved strong agreement with direct benchmark simulations.

## Research experience

- **Case Studies in Applied Mathematics, Data Science/Machine Learning on Dynamic Systems at UArizona**

  August 2023 - Present
  - Developed numerical solvers employing stochastic models to simulate network dynamics (Power/Infrastructure, Transportation/Mobility, Communications). Defined continuous measures of network stress/damage.
  - Performed stochastic and ergodic analysis of network's dynamics using high-order sampling techniques (Importance Sampling, Cross-Entropy Method, Kullback-Leibler Maillard Sampling)
- **Research Assistant, Energy Systems at UArizona** January 2024 - July 2024
  - Developed and implemented an SDE model of IEC Power Grid to assess grid's solidness under a variety of tripping/damage on the system, resulting in the creation of a simple yet efficient sampling engine that highlights and measures the likelihood and location of overloads in the power grid.

## Education

- **PhD in Applied Mathematics,** *Program in Applied Mathematics* Tucson, Arizona August 2022- Present
  - **Relevant Completed Courses**: Methods for Applied Mathematics, Theoretical Foundations of Applied Mathematics, Algorithms
  - **Expected Graduation:** May 2027
  - **Accomplishments:**
    - Received the 'University Fellows Award 2022-2023'
    - Participated in the '2024 Analysis of Partial Differential Equations summer graduate school' at the at the Okinawa Institute of Science and Technology
- **Major in Applied Mathematics,** *School of Sciences UNAM,* Ciudad Universitaria, Mexico City August 2016 - January 2021
  - **Relevant Completed Courses**: Applied Mathematics Analysis, Statistics I,II & III,Stochastics Processes I & II, Numerical Optimization, Multivariate Analysis, Stochastic Simulation and Partial Differential Equations
  - **Thesis**: 'The Spectral Analysis of Switching Diffusion Processes and their Applications'
  - **Accomplishments:**
    - Received the 'UNAM-Santander Study Abroad Scholarship 2020-2021' to study in Canada