VICTOR AUGUSTO DURAES DE FARIA

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EDUCATION

North Carolina State University, Raleigh, NC
Ph.D. in Operations Research (2019 – Spring 2024)
Advisor: Anderson Rodrigo de Queiroz
Major GPA: 3.9/4.0.

Federal University of Itajuba UNIFEI, Brazil
B.S. in Electrical Engineering (2013 - 2018)
Major GPA: 9.0/10.0

Tennessee State University, Nashville, TN
Exchange Program - Electrical Engineering
Major GPA: 4.0/4.0
Scholarship: 08/2015-08/2016

FIELDS OF EXPERTISE

Optimization Methods: Linear, Non-Linear, Integer, Stochastic, Dynamic
Data Analytics: Artificial Neural Networks, Computer Vision, Bayesian Statistics, Clustering Analysis, Detection and Estimation, Time-Series Forecasting
Power Systems: Capacity Expansion, Electric Machines (Synchronous Generators, Induction Motors), Risk/Cost Assessment, Hydro Power Plants, Optimal Power Flow
Programming Skills:
Languages: Python, Matlab, R, Ampl, C++
Libraries: Pyomo, Tensorflow, Gurobi, CPLEX, COIN-OR
Other Software: JMP, ArcMap, SolidWorks, Minitab

LANGUAGES:

Portuguese: Native; English: Fluent; Spanish: Comprehend

JOURNAL PAPERS

1-V.A.D. de Faria, A.R. de Queiroz, J.F. DeCarolis, (2023) Scenario Generation and Risk-averse Stochastic Portfolio Optimization Applied to Offshore Renewable Energy Technologies, Energy.

2-V.A.D. de Faria, A.R. de Queiroz, J.F. DeCarolis, (2022) Optimizing Offshore Renewable Portfolios Under Resource Variability, Applied Energy.

3-V.A.D. de Faria, A.R. de Queiroz, L.M.M. Lima, J.W.M. Lima, B.C. Silva, (2022) An assessment of multi-layer perceptron networks for streamflow forecasting in large-scale interconnected hydrosystems, International Journal of Environmental Science and Technology.

4-V.A.D. de Faria, J.V. Bernardes, E.C. Bortoni, (2020) Parameter estimation of synchronous machines considering field voltage variation during the sudden short-circuit test, International Journal of Electrical Power & Energy Systems.

5-V.A.D. de Faria, A.R. Queiroz, L.M.M. Lima, J.W.M. Lima, (2018) Cooperative Game Theory and Last Addition Method in the Allocation of Firm Energy Rights, Applied Energy.

6- A.R. Queiroz, **V.A.D. de Faria**, L.M.M. Lima, J.W.M. Lima, (2019) Hydropower Revenues under the Threat of Climate Change in Brazil, Renewable Energy.

7- E.C. Bortoni E.C., J.V. Bernardes, P.V.V. da Silva, **V.A.D. de Faria**, P.A.V. Vieira, (2019) Evaluation of manufacturers strategies to obtain high-efficient induction motors, Sustainable Energy Technologies and Assessments

8- J.C. Costa, E.C Bortoni, P.A.V. Vieira, **V.A.D. de Faria**, (2017) Energy System Planning Considering Renewables and Pumped-storage Power Plants, International Journal of Smart Grid and Sustainable Energy Technologies

HONORS & AWARDS:

1- CAPES/CNPq Scholarship: *Brazil Scientific Mobility Program*, 2015

RELEVANT EXPERIENCE

CCEE- Department of Civil, Construction, and Environmental Engineering, NCSU-US
Period: August 2019 - Current, **Main Advisors:** Anderson Rodrigo de Queiroz (2019- Current), Joseph DeCarolis (2019-2022)

- Created programs in Python and MATLAB to help in the economic assessment of renewable energy technologies.
- Implemented Generative Adversarial Neural Network models to create scenarios of renewable energy generation and used these scenarios in stochastic portfolio optimization analysis.
- Developed portfolio optimization models (Mean-Var, and Mean-CVaR) applied to the site selection of offshore renewable energy on the North Carolina coast.
- Ran capacity expansion models to study how renewables can be efficiently integrated into the North Carolina Electrical System.
- Implemented statistical models to assess the risk of extreme events (e.g., Hurricanes) to offshore energy technologies.
- Implemented models to assist in the problem of vehicle routing and assessment of road network vulnerability during extreme flood conditions.

MC&E- Marangon Consulting & Engineering, Brazil
Period: 2017 - 2019, **Advisor:** Anderson Rodrigo de Queiroz, Jose Wanderley Marangon Lima.

- Created programs in Python and TensorFlow to help in the planning and analysis of electrical systems.
- Developed artificial neural network models to improve streamflow forecasting for the Brazilian hydro plants.

EXCEN- Centre of Excellence on Energy Efficiency, Brazil
Period: March 2017 – June 2018, **Advisor:** Edson da Costa Bortoni.

- Developed mathematical models to represent the effect of the field winding voltage variation during the short-circuit test.
- Made tests in synchronous machines to validate the mathematical models developed.

IOE-Industrial and Operations Engineering, Michigan University-US
Period: May 2016 - August 2016, **Advisor:** Pascal Van Hentenryck.

- Developed models and convexification strategies applied to the Optimal Power Flow problem.
- Created optimization models in Ampl.

GESis-Group of Systems Engineering, Brazil
Period: 2014 - 2017, **Advisor:** Anderson Rodrigo de Queiroz , Jose Wanderley Marangon Lima

- Created programs in C++ to help in the planning and analysis of electrical systems.
- Created linear optimization models to evaluate the efficiency of the official governmental model to share energy rights among hydropower agents in Brazil.
- Develop models using cooperative game theory to better allocate energy rights among hydropower plants.
- Assisted in the creation of linear optimization models to analyze the impacts of climatic changes on the remuneration of the Brazilian hydropower plants

RESEARCH PROJECTS

Fused Portfolio, Site, and Device Sizing Optimization for Harnessing North Carolina's Coastal Renewable Energy Resources
Period: August 2022 - August 2023, **Advisors:** Anderson Rodrigo de Queiroz, Chris Vermillion
Funded by the North Carolina Renewable Ocean Energy Program (2022-2023)

- This project aims to create an integrated optimization framework that fuses offshore device sizing, site selection, and resource coordination to minimize the deployment cost of renewable energy technologies on the North Carolina coast.
- **Responsibilities:** Collect data and perform data preprocessing; develop optimization methods and implement them in Python and Matlab; prepare quarterly reports.

Mooring System Analysis and Fragility Curve Estimation: The Economic Impact of Low Probability High Impact Events on Ocean Current Devices
Period: August 2022 - August 2023, **Advisors:** Anderson Rodrigo de Queiroz, Mo Gabr
Funded by the North Carolina Renewable Ocean Energy Program (2022-2023)

- This project aims to improve the modeling/analysis of the mooring systems for ocean current devices

and quantify the risk of damage to this equipment, given extreme ocean conditions.

- **Responsibilities:** Perform data preprocessing; develop Bayesian models to perform statistical analysis on ocean current measurements; estimate the probability of damage to the equipment given a specific ocean condition; prepare quarterly reports.

The Urban Flooding Open Knowledge Network (UF-OKN): Delivering Flood Information to AnyOne, AnyTime, AnyWhere
Period: August 2020 - August 2023, **Advisors:** Anderson Rodrigo de Queiroz, Ranji Ranjithan, Sankar Arumugam
Funded by the National Science Foundation (2020-2023)

- This project aims to build a data network to minimize flood impact. It includes flood forecasting and the creation of tools to assist different urban infrastructures, such as power, transportation, and drinking water systems.
- **Responsibilities:** Translate flood information to the road network system, associating flood levels with road availability and speed reductions; create tools to perform optimal vehicle routing under flood scenarios and perform risk assessment for the routes chosen by the optimization model.

Assessing the Risk of Hurricane Damage to Marine Hydrokinetic Devices
Period: August 2021 - August 2022, **Advisors:** Anderson Rodrigo de Queiroz, Joseph DeCarolis, Mo Gabr
Funded by the North Carolina Renewable Ocean Energy Program (2021)

- This project aims to assess the risk of hurricane damage to marine hydrokinetic devices and integrate this risk into a capacity expansion model for the North Carolina Energy System to assess how the deployment of these devices and other renewables can be affected by hurricanes.
- **Responsibilities:** Develop Bayesian models to estimate the device's vulnerability to hurricane conditions; develop a stochastic capacity expansion model for the North Carolina energy system, integrating the risk of hurricanes in the analysis; write quarterly reports.
- **Publications:** **V.A.D. de Faria**, N. Jamaleddin, A.R. de Queiroz, M. Gabr, (2023) Assessing the Risk of Hurricane Damage to Marine Hydrokinetic Devices, Ocean Engineering (*under review*).

Analyzing Investments in NC Offshore Renewable Energy Under Uncertainty About Resource Availability and Hurricane Damage
Period: August 2020 - August 2021, **Advisors:** Anderson Rodrigo de Queiroz, Joseph DeCarolis
Funded by the North Carolina Renewable Ocean Energy Program (2020)

- This project aims to assess the uncertainty of offshore renewable energy resources' variability and the risk of hurricane damage for these devices.
- **Responsibilities:** Develop a Generative Adversarial Neural Network Model to create synthetic scenarios of energy generation for wind, wave and ocean current resources over a large geographic region, ensuring the consistency of this data with historical observations; develop a stochastic optimization model to perform site selection and risk minimization of offshore deployments; perform initial estimates of the risk of hurricane damage to the offshore infrastructure; write quarterly reports.
- **Publications:** **V.A.D. de Faria**, A.R. de Queiroz, J.F. DeCarolis, (2023) Scenario Generation and Risk-averse Stochastic Portfolio Optimization Applied to Offshore Renewable Energy Technologies, Energy.

Optimizing Investments in Offshore Renewable Energy in the North Carolina Electric Sector
Period: August 2019 - August 2020, **Advisors:** Anderson Rodrigo de Queiroz, Joseph DeCarolis
Funded by the North Carolina Renewable Ocean Energy Program (2019)

- This project aims to develop a portfolio optimization model to perform site selection of renewable energy technologies based on the mean-variance portfolio theory.
- **Responsibilities:** Collect data from wind, wave, and ocean current resources; perform cost assessments; perform data preprocessing; develop and implement optimization models to perform site/resource selection and energy variance minimization at different energy cost levels.
- **Publications:** **V.A.D. de Faria**, A.R. de Queiroz, J.F. DeCarolis, (2022) Optimizing Offshore Renewable Portfolios Under Resource Variability, Applied Energy.

Artificial Neural Networks Applied to Stream Flow Forecasting in Hydro Plants.
Period: 2018 - 2019, **Advisors:** Jose Wanderley Marangon Lima, Anderson Rodrigo de Queiroz
Internship 2018-2019

- This project aims to develop artificial neural networks to forecast short-term stream flows for more than 140 hydro plants in Brazil.
- **Responsibilities:** Collect streamflow data from the Brazilian Independent System Operator; collect rainfall data from the GEFS- NOAA model; develop neural networks to forecast streamflow at more than 140 hydro plants; create the necessary codes to perform automatic daily forecasting of all hydro plants, reporting errors of previous estimates.
- **Publications:** **V.A.D. de Faria**, A.R. de Queiroz, L.M.M. Lima, J.W.M. Lima, B.C. Silva, (2022) An assessment of multi-layer perceptron networks for streamflow forecasting in large-scale interconnected hydrosystems, International Journal of Environmental Science and Technology.

A Study of The Field Winding Voltage Variation During the Short-Circuit Test, and its Influence in the Parameter Identification of Synchronous Machines.
Period: 2018 - 2019, **Advisor:** Edson da Costa Bortoni
Bachelor's Thesis 2019

- The Short-Circuit Test is traditionally used in the parameter identification of synchronous machines. According to the standards, this test has to be done with constant field winding voltage. However, it is possible to notice that, under some conditions, when the short-circuit is applied, this voltage does not keep constant. In these specific conditions, the project aims to evaluate the influence of the phenomenon in the parameter identification of synchronous machines.
- **Responsibilities:** Perform short-circuit tests on synchronous machines; develop mathematical models to recover the machine parameters
- **Publications:** **V.A.D. de Faria**, J.V. Bernardes, E.C. Bortoni, (2020) Parameter estimation of synchronous machines considering field voltage variation during the sudden short-circuit test, International Journal of Electrical Power & Energy Systems.

Cooperative Game Theory in The Allocation of Firm Energy Rights
Period: 2016 - 2017
Advisor: Anderson Rodrigo de Queiroz, Jose Wanderley Marangon Lima

- Firm Energy is a parameter used in some electricity markets that work as a ballast for energy sales. This project investigates a method to allocate Firm Energy Rights among hydro plants using cooperative game theory, such that the interests of the hydro agents could be better coordinated with the needs of the regulatory agencies.
- **Responsibilities:** Propose different models to perform energy allocation and assess their strengths and weakness; develop optimization models to solve the allocations proposed.
- **Publications:** **V.A.D. de Faria**, A.R. Queiroz, L.M.M. Lima, J.W.M. Lima, (2018) Cooperative Game Theory and Last Addition Method in the Allocation of Firm Energy Rights, Applied Energy.

Economic Analysis of Climate Changes in the Remunerations of Hydro Power Plants in Brazil
Period: 2015 - 2017
Advisor: Anderson Rodrigo de Queiroz, Jose Wanderley Marangon Lima

- This project studied the economic impacts of climatic changes on the remuneration of the hydropower plants in Brazil.
- **Responsibilities:** Develop energy system optimization models (in C++) to evaluate different climate scenarios and their impact on electricity costs.
- **Publications:** A.R. Queiroz, **V.A.D. de Faria**, L.M.M. Lima, J.W.M. Lima, (2019) Hydropower Revenues under the Threat of Climate Change in Brazil, Renewable Energy.

Optimal Power Flow, a Convex Relaxation
Period: May 2016 - August 2016
Academic Training 2016, **Advisor:** Pascal Van Hentenryck

- This project studied convexification methods that could be applied to the Optimal Power Flow problem in the search for global optimal solutions. The Optimal Power Flow is an important problem related to finding the optimal voltages and angles of busses in the transmission system so that the energy system

operation costs can be minimized.

- **Responsibilities:** Propose different models to perform convexification of the Optimal Power Flow problem; evaluate the efficiency of the proposed methodologies in different standard benchmarks.

Multiple Solutions in the Allocation of Assured Energy Among Hydro Agents
Period: May 2014 - August 2015
Advisor: Anderson Rodrigo de Queiroz
Scientific Initiation Scholarship by FAPEMIG 2014

- This research identified a possible problem with the official governmental model used in the allocation of energy rights among hydro agents and showed how deeply this problem could impact the remuneration of the hydropower plants in Brazil.
- **Responsibilities:** Developed the optimizations models necessary to prove the inconsistency in the formulation used by the Brazilian regulatory agencies
- **Publications:** **V.A.D. de Faria**, A.R. Queiroz, L.M.M. Lima, J.W.M. Lima, (2018), Analysis of Multiple Solutions in The Calculus of Firm Energy, SBSE: Brazilian Symposium of Electrical Systems.