João Augusto Silva Lêdo

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Summary

I'm a **Computer Engineer** holding a **Ph.D. in Electrical Engineering** with a focus on Electric Power Systems - **Electricity Markets** with a solid background in **math optimization, planning in energy markets and coding**, demonstrated by **professional and research experience** and by multiples **publications** in **conferences** in Latin America and in International **Scientific Journals**.

Education

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
Ph.D. in Electrical Engineering   Jan. 2021 – May 2025
- Focus on: Operational Research, such as, Stackelberg Game (bilevel modeling - MPEC), Equilibrium Models (Nash, EPEC) and Electricity Markets, such as, Strategic Offering Models, Equilibria among strategic players.

The Ohio State University – OSU   Columbus, OH, USA
Visiting Ph.D. Scholar Researcher   Nov. 2022 – Apr. 2023
- Focus on: Operational Research, such as, Stackelberg Game (bilevel modeling - MPEC), Equilibrium Models (Nash, EPEC) and Electricity Markets, such as, Strategic Offering Models, Equilibria among strategic players.

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
M.Sc. in Electrical Engineering   Aug. 2018 – Dec. 2020
- Focus on: Operational Research, such as, Stackelberg Game (bilevel modeling - MPEC), and Electricity Markets, such as, Strategic Offering Models, Equilibria among strategic players.

Centro Universitário Católico Salesiano Auxilium – UNISALESIANO   Araçatuba, SP, Brazil
B.Sc. in Computer Engineering   Aug. 2013 – Mar. 2018

Research Experience

A study of an equilibrium among strategic producers and consumers (Sponsored by CAPES).   Aug. 2023 – May 2025
(co-advised by Dr. Antonio J. Conejo and Dr. Leonardo Nepomuceno)

With this study we found out that regardless of all players being strategic, depending on their size, the equilibrium may benefit the larger producer or consumer when a market is made of strategic player (producers and consumers) relatively with the same size, the equilibrium among the strategic players leads to the same results of Perfect Competition among players. To this study we used:
- A single model reformulation of strategic bilevel models of producers and consumers in equilibrium, coded in GAMS.

Solving a bilevel strategic offering model in a hydrothermal energy market (Sponsored by CAPES) Jan. 2020 – Dec. 2023
(co-advised by Dr. Antonio J. Conejo and Dr. Leonardo Nepomuceno)

With this study we found out that the strategic behavior from a large generation company forces the market clearing prices to higher prices, thereby increasing either the strategic and non-strategic companies' profits and reducing the consumer utility. Also, such strategic behavior leads to water savings to the strategic company reservoirs due to the reduced power output from the strategic company's hydro plants. To this study we used:
- A Stackelberg Game bilevel model considering an entire market clearing model as a lower-level model to the strategic company upper-level model and introducing a convexification approach, implemented in GAMS.

Professional Experience

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
Created and Lectured a course: Coding in GAMS with focus on Electricity Markets   Feb. 2025 – Mar. 2025

After my time in the USA at The Ohio State University I've created this course to spread the knowledge in my university campus in Brazil to help students with their own Ph.D. research modeling problems, where I:
- Lectured general concepts of coding in GAMS and its structure.
- Lectured about overall aspects of electricity markets.
- Introduced the ideas of perfect competition versus strategic behavior in electricity markets.
- Introduced the concept of optimization models in equilibrium.
- Lectured about Stackelberg game structures and bi-level formulation as an approach to behave strategically.

- Lectured about multi-leader-follower game structures and Nash equilibrium in competitive electricity markets.

The Ohio State University - OSU   Columbus, OH, USA
Visiting Ph.D. Scholar Researcher   Nov. 2022 – Apr. 2023
- Modeled a bilevel strategic offering model for a generation company in a hydrothermal energy market.
- Participated to weekly meetings under the development of Stackelberg Game bilevel strategic offering model.
- Attended to class covering topics such as complementary theory and applications, optimality and complementarity, Equilibria, MPECs and EPECs.

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
Assisted in Electrical Power Systems I Class [Online]   Nov. 2022 – Feb. 2023
- Assisted the Professor in charge to elaborate and grade the students' homework.

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
Created and Lectured a course: Logic and Structure with practice coding on MATLAB   Oct. 2021 – Dec. 2021
As a Computer Engineer I focused on breaking down advanced concepts of coding to help Ph.D. students on my campus, with many different backgrounds, to have a clear vision on how to code strategically, where I:
- Lectured general concepts about computer science and coding such as math and logic operators, data types (int, float, char, structure), routines and functions.
- Lectured on how to wisely structure an algorithm in routines to easily accomplish its goals.
- Lectured how to control data flow (if, for, while) and storage it in arrays, strings, matrices, cell-array (Tensor).
- Lectured about different rules of storage such as Line (FIFO - First in First Out), Stack (LIFO – Last in First Out).
- Lectured about object-oriented coding.
- Introduced about simple searching algorithms such as Bubble Sort, deterministic search such as Simplex and Interior-Points, evolutionary algorithms such as Genetic Algorithms and AI.

Universidade Estadual Paulista – UNESP   Bauru, SP, Brazil
Assisted in Numerical Calculus Class   Mar. 2020 – Aug. 2020
- Assisted the Professor in charge to elaborate and grade the students' homework.

Skills & Interests
Technical: GAMS, OPL-IBM CPLEX Studio, MATLAB, C, C++, Ruby, Python, LaTeX.
Mathematical Optimization: Stackelberg Game, Nash Equilibrium, Mathematical Programming with Equilibrium Constraints (MPEC), Equilibrium Problem with Equilibrium Constraints (EPEC).
Language: English, Portuguese

Research Publications
- **João A.S. Lêdo**, Leonardo Nepomuceno, Antonio J. Conejo. "Equilibria among strategic producers and strategic consumers: A solution approach relying on a single optimization problem". IISE Transactions – Operations Engineering & Analytics. Accepted on November 23, 2025.
- **João A.S. Lêdo**, Leonardo Nepomuceno, Antonio J. Conejo, Solving a bilevel strategic offering model for a generation company in a hydrothermal energy market: A new convexification approach. EPSR, v.237, p.110986, 2024. DOI: https://doi.org/10.1016/j.epsr.2024.110986
- Mathematical Optimization Meets Energy Industry Conference at IMPA – OptFest (Jun. 23rd, 2023); Presentation: "Market Clearing Procedures in Electricity Markets with Perfect Competition: An Equilibrium Analysis"
- XXIII Automatic Brazilian Conference (CBA) – Session of Power Systems (Nov. 24th, 2020); Presentation: "Strategic Offering Model Formulated as Mathematical Programming with Equilibrium Constraints for a Price-Maker Company" DOI: https://doi.org/10.20906/CBA2022
- III Engineering, Management and Innovation Symposium (SENGI) – Session 5: Operational Research (Aug. 27th, 2020); Presentation: "Strategic Offering Model Formulated as Mathematical Programming with Equilibrium Constraints" DOI: https://doi.org/10.29327/sengi2020.270980
- III FEB (COPENG) – Session Electrical Engineering (Oct. 3rd, 2024); Presentation: "Quadratic Conic Optimization"
- II FEB Post-Graduation Conference (COPENG) – Session 2: Automation (Oct. 19th, 2023); Presentation: "Convexification approach of bilinear terms"