

PhD student call :

We are currently recruiting two graduate students at the PhD level to pursue research on simulation techniques based on optimization and machine learning methods for renewable energy systems. We invite applications for PhD positions at Polytechnique Montréal, located in Montréal, Canada.

Keywords : optimization, operational research, machine learning, power systems, power electronics converters, renewable energy resources, inverter-based resources.

Project descriptions : Power electronics converters are essential for integrating renewable resources into electric grids. As their number is growing, it becomes critical to carefully assess their potential impacts on power systems, e.g., with regard to stability, reliability, and safety. Characterizing the impacts of power electronics converters – and ultimately mitigating these impacts – entails running computational resources- and time-intensive time-domain offline and real-time simulations.

The main research goal is to propose new machine learning- and optimization-based methods for real-time simulation of power electronics converters. The main goal is devised into three fundamental research directions : 1) build comprehensive learning-based models for power electronics simulation, 2) design the computational engine to support combined physics- and learning-based simulation on heterogeneous hardware like central processing units, graphical processing units, and field programmable gate arrays, and 3) robustly identify the safe operating space of a power electronics converter using a minimum number of time-domain simulations.

Research group : The Laboratory for Optimization of Renewable Electric gRids (LORER) is a research group consisting of students and researchers at all levels (bachelor/engineering degree, master, PhD and postdoctoral fellows) who are working on the design of mathematical methods using a blend of optimization and machine learning for decision-making in renewable energy systems. The research group is affiliated with international research centres focused on operational research and artificial intelligence, the [GERAD](#) and [Mila](#), respectively.

Program : PhD (4-year program).

Academic unit : Department of Electrical Engineering, Polytechnique Montréal.

Supervisors : [Prof. Antoine Lesage-Landry](#), [Prof. Güneş Karabulut Kurt](#), [Prof. Maxime Berger](#) ([UQAR](#)).

Required background : The candidate should have an undergraduate and a Master's degree in Electrical Engineering, Applied Mathematics or any other relevant field. The candidate should possess mathematical maturity and a strong interest in optimization, mathematical modelling, and machine learning in addition to a background in power systems, power electronics, and programming (Python, C++, Julia).

Funding : \$25,000/year stipend.

Starting date : As soon as possible (Winter 2025, Summer 2025, Fall 2025).

Application : If you are interested in this position, please send your CV, cover letter, and recent transcripts to Prof. A. Lesage-Landry : antoine.lesage-landry@polymtl.ca. Please indicate *PS-Simulations : PhD Application* in the subject line of your e-mail.

Diversity and inclusion within our team : We emphasize the diversity of individuals by fostering a work environment where individual differences are recognized, appreciated, respected, and valued to help each person reach their full potential.