



**POLYTECHNIQUE
MONTRÉAL**

UNIVERSITÉ
D'INGÉNIERIE

**Department of Mathematics and
Industrial Engineering
Department of Electrical
Engineering**
2900, boul. Édouard-Montpetit
Campus de l'Université de Montréal
2500, chemin de Polytechnique
Montréal (Québec) Canada
H3T 1J4

PhD Title

Online stochastic optimization for demand response of dynamic loads

Keywords

Renewable integration, demand response, frequency regulation, real-time decision-making/optimization, mixed-integer optimization, stochastic optimization

Short description

The integration of renewable sources of generation in the electric power system requires sustained frequency regulation to ensure the stability of the grid. Frequency regulation is a fast-time scale power balancing service that can be provided through demand response of flexible load aggregations. For example, a thermostatic load (air conditioner, HVAC, water heater) can be sequentially turned on and off to modulate the aggregation's power consumption. While this can offer much of the needed flexibility for the grid and can be used to support the grid operations, the loads are dynamic and subject to several constraints that must be accounted for to provide adequate and continuous regulation services, e.g., temperature constraint and operational constraints. Moreover, this type of demand response necessitates that the control decisions be dispatched within few seconds.

The candidate would explore sequential decision-making process under uncertainty and develop dedicated real-time optimization models and methods for demand response of dynamic loads.

Research fields

Operation research, electric power systems

University departments

Mathematics and Industrial Engineering, Polytechnique Montreal
Electrical Engineering, Polytechnique Montréal

Supervisors

Antoine Legrain, Polytechnique Montreal
Antoine Lesage-Landry, Polytechnique Montréal

Requirements

The candidate must hold a Master of Research in Operations Research or any connected field and have an introductory background in power systems.

or

The candidate must hold a Master's degree in Electrical Engineering or in a relevant field and have a strong background in mathematics.

Conditions

Financial support of 22 000\$ per year

Documents

Degrees, academic transcripts, CV, cover letter and reference letter

To apply

Email all documents to antoine.legrain@polymtl.ca and antoine.lesage-landry@polymtl.ca



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Deadline

From now until the position is filled

Starting date

According to the availability of the candidate

Research environment

The candidate would work in the GERAD offices. The GERAD has a reputation as a first-class operations research center, where the best researchers and professionals are trained. It develops and communicates state-of-the-art knowledge on all aspects of the mathematics of decision making in large, complex systems be they technological, commercial or economic, and ahead of decision making, to develop the mathematics of model building as pertaining to statistical analysis, simulation and data mining.