

PhD position at IFP Energies nouvelles (IFPEN) *Mathematics*

Control strategies for a wind farm based on a simplified dynamical wake modeling

In the field of wind energy, operators are now focusing on using wind turbines located in wind farms in the best possible way, to either produce the maximum energy possible, or produce the right amount of energy at the right time, to meet power grid requirements while limiting the wind turbine mechanical stress, in order to eventually minimize the cost of energy.

It is possible to limit the interactions between a turbine wake and the downwind turbines by controlling its yaw angle and power produced, and thus alleviating the production losses and mechanical fatigue. In this context, our central question will be *“How to robustly minimize a wind farm cost of energy via a control algorithm using a dynamic wind farm flow model, and how to implement it in real world”*.

The PhD results will contribute to three major advances:

1. Develop wind farm control strategies based on a time-varying wake modeling and evaluate their added value.
2. Define a cost criterion allowing to efficiently minimize the cost of energy over long time horizons.
3. Contribute to the implementation and deployment of the developed control algorithms and prove and illustrate their robustness and efficiency.

Keywords: Wind turbines, Wind farms, Control, Estimation, Optimal Control, Optimization, Predictive control

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IFPEN supervisor	PhD, COLLET David, Research engineer, Control, signal and systems department, david.collet@ifpen.fr, 0000-0002-0022-9572
PhD location	IFP Energies Nouvelles, Lyon, France
Duration and start date	3 years, starting in fourth quarter 2024
Employer	IFP Energies Nouvelles, Lyon, France
Academic requirements	University Master degree mathematics or mechanical engineering
Language requirements	Fluency in French or English, willingness to learn French
Other requirements	Control systems, optimization, signal processing

To apply, please send your cover letter and CV to the IFPEN supervisor indicated here above.

About IFP Energies nouvelles

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