

# Wind Farm

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## Abstract

*This will be the abstract of our paper. We will show how cool our research is and how important we are.  
Blabla Lorem ipsum.*

## I. INTRODUCTION

With an increasing role of wind energy in Europe's energy production (nationale energieverkenning) it is important for wind farms to be able to meet the demands of the power grid (Tande). Controlling the power output of a wind farm is essential because an overload of energy can decrease the stability of the power system (Tande). Currently, most wind farms operate based on "greedy control", meaning that the individual turbines always try to deliver maximum power. This causes a problem when the power demand is low and the dependency on the wind energy is high, resulting in an overload of the power system. Active power control can solve this problem, by regulating the power output of a wind farm.

Misschien ergens nog iets over een wake? Over wind farms algemeen?

There are several methods of active power control in a wind farm, two of which will be discussed in this paper, that is, yaw control and axial induction control. Yaw control can be used as a method to reduce the power output of a single wind turbine (verwijzing). A disadvantage of yawing is an increase of the load on the turbine, and thus reducing its lifespan (Zalkind, Kanev). In addition, yawing a turbine can result in an asymmetrical overlap of the wake on the downwind turbine. This can significantly increase the loads of the downwind

turbine (Wilson, Van Dijk, Bastankah). As yawing of the turbine and the deflection of a wake can cause additional loads on the turbines of a wind farm, a trade-off must be made between active power control and loads optimization. Axial induction can control the power output by varying the axial induction factor. Loads that are introduced by axial induction will not be discussed in this paper.

Previous studies have mainly focused on optimizing the power output, rather than controlling the power output (verwijzingen naar studies die dit hebben gedaan). Other studies focus on power optimization, while also taking the loads into account, so that an optimum is found between the two (verwijzing naar wie dit heeft gedaan). The use of axial induction in optimizing power control has been marginally studied. Active power control through a combination of yaw control and axial induction control while minimizing loads is still novel.

This paper will focus on the optimization of active power control and loads by means of yaw misalignment and axial induction. In addition, a method is developed so that on-site power control can be realized.

Hier nog een overzicht van wat er in paper te vinden is. Moet later geschreven worden als de rest af is.

What is the subject about?

- General introduction about wind energy, wind farms, wakes, and optimization

strategies.

- Maybe problem statement here??

Why is this relevant?

- Problem statement
- What can be gained by optimization?

State-of-the-Art.

- What did other people do to solve this problem?

What is different/new about our research?

- What did we do compared to other people?

What can the reader expect to find in this paper?

- Overview of paper

What are the most important results/conclusions of this paper?

## II. METHODS

Describe the techniques used.

- Here we introduce FLORIS, FAST, Mlife
- FLORIS: why FLORIS compared to other software? How does FLORIS work? How do we use it?
- FAST & Mlife:
- LUT: What is the LUT and why? What parameters did we choose, and why? Information about the step size of the parameters. Details in supporting info.
- Optimization: Game Theory

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**Table 1:** Example table

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First name	Last Name	Grade
John	Doe	7.5
Richard	Miles	2

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Text requiring further explanation<sup>1</sup>.

## III. RESULTS

Figures, tables with results and explanation.

Discuss what can be improved

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<sup>1</sup>Example footnote

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#### IV. DISCUSSION

##### i. Subsection One

What have we done and how to interpret the results

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##### ii. Subsection Two

Recommendations for further studies

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#### REFERENCES

[Figueredo and Wolf, 2009] Figueredo, A. J. and Wolf, P. S. A. (2009). Assortative pairing and life history strategy - a cross-cultural study. *Human Nature*, 20:317–330.