

Accepted Manuscript

Experiments on lift dynamics and feedback control of a wind turbine blade section

V. Jaunet, C. Braud

PII: S0960-1481(18)30322-7

DOI: [10.1016/j.renene.2018.03.017](https://doi.org/10.1016/j.renene.2018.03.017)

Reference: RENE 9886

To appear in: *Renewable Energy*

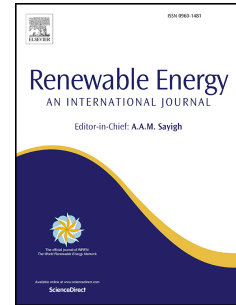
Received Date: 1 August 2017

Revised Date: 8 March 2018

Accepted Date: 9 March 2018

Please cite this article as: Jaunet V, Braud C, Experiments on lift dynamics and feedback control of a wind turbine blade section, *Renewable Energy* (2018), doi: 10.1016/j.renene.2018.03.017.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Experiments on lift dynamics and feedback control of a wind turbine blade section

V. Jaunet, C. Braud

*LHEEA lab. - CNRS - Ecole Centrale Nantes
1 rue de la Noë,
44100 Nantes*

Abstract

An experimental campaign is performed to the study of feedback lift control applied to a wind turbine blade. A 5-digit NACA profile whose trailing edge is rounded for circulation control purposes is used in combination with fluidic actuation. It is first shown in this article how the modified profile performs, in terms of aerodynamic forces, in both natural and manipulated cases. Then, the dynamics of controlled pressure (and thus lift) establishment is identified. A discussion is given on the speed of lift dynamics in comparison with previous studies and on its ability to overcome lift perturbations due to external perturbations. Finally, a feedback lift control experiment is performed showing the feasibility of such control in a wind turbine environment.

Keywords: Feedback control, Wind turbine, Lift

1. Introduction

Wind turbines evolve in the atmospheric boundary layer at a height where strong wind velocity fluctuations in both amplitude and direction can be found [1]. These fluctuations not only modify the actual forces acting on the blade but can also lead to dynamic stall [2, 3], therefore creating undesirable mechanical loads on the turbine that can lead to severe damages. Controlling the lift of the individual wind turbine blades may thus be considered to soften these undesired

Download English Version:

<https://daneshyari.com/en/article/6764221>

Download Persian Version:

<https://daneshyari.com/article/6764221>

[Daneshyari.com](https://daneshyari.com)