Aeroelastic Analysis of B75 blade - Blatigue Project

Galinos, Christos

Publication date:
2018

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Aeroelastic Analysis of B75 blade
Blatigue Project

Christos Galinos
DTU Wind Energy Report I–0816(EN)
September 2018
Summary:
This report is part of the EUDP Blatigue project, Fast and efficient fatigue test of large wind turbine blades. In the study the Siemens B75 blade loads are computed using HAWC2 aeroelastic code. The blade is coupled in the DTU 10MW rwt tower and nacelle structure within HAWC2. Furthermore the basic DTU WE controller is used. The aim is to evaluate the blade fatigue and ultimate loads based on the IEC 61400-1 ed.3 standard. The results are further used in the project for the set-up and testing of the real blade at the DTU Risø Large Scale Facility.

In the first part the model properties are summarized. Then the IEC load cases are simulated using the HAWC2 code and the analysis is focused on the blade performance. A blade load comparison between HAWC2 and the Siemens results is presented together with a summary of the uncertainties related with the present analysis.

The work is funded by the EUDP project BLATIGUE: Fast and efficient fatigue test of large wind turbine blades under project number 64016-0023 which is gratefully acknowledged.

Several contributions have been made in the model set-up as well as in the interpretation of the results from Torben J. Larsen, Anders M. Hansen, Kim Branner, Perer Berring and Federico Belloni who are gratefully acknowledged.
## Contents

1 Introduction 4  
1.1 Wind Turbine Model 4  
1.2 Component Structural Properties 5  
1.3 Blade Geometry 5  
1.4 HAWC2 Simulation Parameters 7  

2 Eigenvalue Analysis 8  
2.1 WT structure natural frequencies and damping 8  
2.2 Blade natural frequencies and damping 8  

3 Normal Power Production Simulations 9  

4 Blade Section Stresses-Strains 11  

5 Blade Lifetime Fatigue Damage 14  

6 Ultimate Load Analysis 25  

7 Uncertainties in the Load Analysis 29  

8 Acknowledgements 30  

9 References 31  

Appendices 32  

A WT component structural properties 32  

B DLC 1.2 Blade section - statistics and 1Hz equivalent loads 38  

C Blade lifetime fatigue 44  
  C.1 Section Moments 44  
  C.2 Section Strains 44