

Bruce LeBlanc

AEROSPACE · MECHANICAL ENGINEER

Buitenhof 48D, Den Haag, Zuid-Holland, The Netherlands

☎ (+36) 6 4237 9008 | ✉ bleblanc18@gmail.com | 🌐 bruce-leblanc-9a869910 | 🐦 @windward18

Education

Delft University of Technology

PHD IN AEROSPACE ENGINEERING - DYNAMICS OF THE PITCH-ABLE VERTICAL AXIS WIND TURBINE

Mekelweg 5, 2628CD Delft, ZH

2016 - 2020 exp

- Aerospace PhD Council Member 2017-2019

University of Massachusetts - Lowell

M.S. IN MECHANICAL ENGINEERING - GPA: 3.68/4.0

220 Pawtucket St, Lowell MA 01854

2009 - 2011

B.S. IN MECHANICAL ENGINEERING - CUM LAUDE GPA: 3.4/4.0

2005 - 2009

- Formula SAE: Suspension, steering, and braking systems lead
- Secretary Pi Tau Sigma

Experience

Delft University of Technology

POST-DOC / RESEARCHER

Mekelweg 5, 2628CD Delft, ZH

Mar 2020 - Present

- Wind tunnel testing of multi-element airfoil for 40% thick base airfoils
- Aero-elastic design and analysis of Vertical Axis Wind Turbines

DOCTORAL CANDIDATE

Mar 2016 - Mar 2020

- Designed, built, analyzed, and tested, vawt focusing on circulation control using individual blade pitch for power and thrust control
- Experimental characterization and development of digital twin
- Airfoil and pitch trajectory optimization for vertical axis wind turbines
- Contributed to course content and preparation for Rotor and Wake Aerodynamics and Wind Turbine Aero-elasticity

Sandia National Laboratories - Wind Power Technologies

SENIOR / MEMBER OF TECHNICAL STAFF

1611 Innovation Pkwy SE, Albuquerque, NM 87123

Oct 2011 - Mar 2016

- PI: T-SPEAR, Tool for Siting, Planning, and Encroachment Analysis for Renewables, Model framework to analyze wind turbine radar interference
- Deputy PI: Scaled Wind Farm Technology (SWiFT) Facility Construction and Commissioning - Employee Recognition Award 2014
- Instrumentation design for SWiFT facility turbines
- Leader hardware safety systems design and implementation for SWiFT wind turbines
- Leader full system dynamic characterization and turbine aero-elastic model calibration of SWiFT turbines and sub-components
- Sensors and blade design team for National Rotor Testbed, next-generation aerodynamically scaled turbine blade
- Data acquisition and analysis of SMART active aerodynamic rotor and "Sensored Rotor" projects

Structural Dynamics and Acoustic Systems Laboratory - UMass Lowell

GRADUATE RESEARCH ASSISTANT

220 Pawtucket St, Lowell MA 01854

Jun 2009 - Sep 2011

- Effects of defects in composite materials, e.g., waves in glass and carbon composites used in wind turbine spar-caps using a combination of non-destructive testing techniques including Digital Image Correlation, fiber optic and foil strain sensors, accelerometers and microphones
- Led and performed impact modal test on Rolls Royce turbine generator vibration isolation system
- Determined mode shapes experimentally and compared with a finite element model for validation using MAC (Modal Assurance Criterion) and POC (Pseudo Orthogonality Check)

LMS Engineering Services

ENGINEERING ASSISTANT

5755 New King Drive 100, Troy, MI 48098

Feb 2011 - April 2011

- Performed model correlation and updating of multiple-penetrator systems to understand effects of impact on modal parameters

National Renewable Energy Laboratory

RESEARCH PARTICIPANT PROGRAM

15013 Denver W Pkwy, Golden, CO 80401

Jun 2010 - Sep 2010

- In-situ modal characterization and aero-elastic model development of GE 1.5MW wind turbine

Trelleborg Sealing Solutions

ASSISTANT DESIGN AND MANUFACTURING ENGINEER

10A Forbes Rd, Northborough, MA 01532

Jun 2008 - May 2009

- Aided design and manufacturing of tooling components for aircraft seals for military and commercial aviation

Skills

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|------------------------------|--|
| Testing | National Instruments - LabView, Siemens / LMS Test.Lab, FEMTools, Polytec 3D Vibrometry, GOM Digital Image Correlation Point Tracking, LAVision Particle Image Velocimetry |
| Analysis Tools | ANSYS, Nastran, FEMAP, ABAQUS, FAST, Siemens SimCenter3D, LMS Virtual.Lab |
| Computer Aided-Design | Solidworks, Catia, Pro-Engineer |
| Programming | Python, Matlab, LaTeX |
| Practical | Machine shop experience, high-angle rescue certified (prev.) |

Publications

JOURNAL PAPERS

Damage detection and full surface characterization of a wind turbine blade using three-dimensional digital image correlation

STRUCTURAL HEALTH MONITORING

December 2013

- Bruce LeBlanc, Christopher Niezrecki, Peter Avitabile, Julie Chen, James Sherwood
- doi: 10.1177/1475921713506766

Inspection and monitoring of wind turbine blade embedded wave defects during fatigue testing

STRUCTURAL HEALTH MONITORING

May 2014

- Christopher Niezrecki, Peter Avitabile, Julie Chen, James Sherwood, Troy Lundstrom, Bruce LeBlanc, Scott Hughes, Michael Desmond, Alan Beattie, Mark Rumsey, Sandra Klute, Renee Pedrazzani, Rudy Werlink, John Newman
- doi: 10.1177/1475921714532995

CONFERENCE PAPERS

Experimental demonstration of thrust vectoring with a vertical axis wind turbine using normal load measurements

Amherst, MA, USA

NORTH AMERICAN ACADEMY WIND ENERGY / WINDTECH

October 2019

- Bruce LeBlanc, Carlos Ferriera

Experimental determination of thrust loading of a 2-bladed vertical axis wind turbine

Milan, Italy

THE SCIENCE OF MAKING TORQUE FROM WIND

June 2018

- Bruce LeBlanc, Carlos Ferreira

Overview and design of PitchVAWT: vertical axis wind turbine with active variable pitch for experimental and numerical comparison

Kissimmee, Florida, USA

AIAA SciTECH FORUM WIND ENERGY SYMPOSIUM

January 2018

- Bruce LeBlanc, Carlos Ferreira

Overview of the dynamic characterization at the DOE/SNL SWiFT Facility

Orlando, Florida, USA

INTERNATIONAL MODAL ANALYSIS CONFERENCE IMAC XXXII

February 2014

- Bruce LeBlanc, David Cloutier, Timothy Marinone
- paper: 32i-250

Surface Stitching of a wind turbine blade using digital image correlation

New York, NY, USA

TOPICS IN MODAL ANALYSIS II

2012

- Bruce LeBlanc, Christopher Niezrecki, Peter Avitabile, James Sherwood, Julie Chen

Hybrid sets of merged data for modal applications

Orlando, Florida, USA

INTERNATIONAL MODAL ANALYSIS CONFERENCE IMAC XXIX

February 2011

- Louis Thibault, Bruce LeBlanc, Peter Avitabile
- doi: 10.1007/978-1-4419-9305-2-11

TECHNICAL REPORTS

Sandia SWiFT Wind Turbine Manual

Albuquerque, NM, USA

SANDIA NATIONAL LABORATORIES

2016

- Jonathan White, Bruce LeBlanc, Jonathan Berg, Joshua Bryant, Wesley Johnson, Joshua Paquette
- SAND2016-0746

Description and Analysis of the hardware Safety Systems for the DOE/SNL

SWiFT Wind Turbines

SANDIA NATIONAL LABORATORIES

- Bruce LeBlanc, Joshua Paquette
- SAND2016-0666

Albuquerque, NM, USA

2016

An Aeroelastic Reference Model for the SWiFT Turbines

SANDIA NATIONAL LABORATORIES

- Brian Resor, Bruce LeBlanc
- SAND2014 - 19136

Albuquerque, NM, USA

2014

IFT&E Industry Report Wind Turbine-Radar Interference Test Summary

SANDIA NATIONAL LABORATORIES

- Benjamin Karlson, Bruce LeBlanc, David Minster, Donan Estill, Bryan Miller, Franz Busse, Chris Keck, Jonathan Sullivan, David Brigada, Lorri Parker, Richard Younger, Jason Biddle
- SAND2014 - 19003

Albuquerque, NM, USA

2014

Presentations

Variation of rotor loading and wake development due to fixed pitch offset in VAWTs

WIND ENERGY SCIENCE CONFERENCE

Cork, Ireland

June 2019

Exploring VAWT dynamics with active variable pitch

EUROPEAN ACADEMY OF WIND ENERGY 14TH PHD SEMINAR- INVITED LECTURE

Brussels, Belgium

September 2018

Experimental characterization of individual pitch controlled vertical axis wind turbine

WIND ENERGY SCIENCE CONFERENCE

Copenhagen, Denmark

June 2017