a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA

The University of British Columbia
Faculty of Applied Science
School of Engineering
Okanagan Campus
1137 Alumni Avenue
Kelowna, BC Canada V1V 1V7
Phone 250 807 8723
Fax 250 807 9850
www.ubc.ca/okanagan/engineering

March 15, 2019

Funded Research Assistant Position Available – Evaluation of Leading-Edge Droops for Performance Enhancement of Wind Turbine Rotors (Masters student opportunity)

Position description

Dr. Joshua Brinkerhoff of the UBC School of Engineering and UBC Okanagan Computational Fluid Dynamics Laboratory invites applicants for a Masters of Applied Science (MASc) position in the area of **Experimental and Numerical Evaluation of Leading-Edge Droops for Performance Enhancement of Wind Turbine Rotors**. The position is open to students who have completed a Bachelors degree in mechanical engineering or related discipline. Applicants with interests in fluid mechanics, computational fluid mechanics (CFD), numerical simulation, and wind energy are encouraged to apply. The successful candidates will be required to work independently and must communicate well in English. Some provincial travel may be required in order to collaborate with the industrial partner located in Christina Lake, BC. *The successful candidate will be financially supported*. This position is available to Canadian citizens, permanent residents of Canada, and international applicants meeting the admission criteria for UBC Okanagan and School of Engineering. It is expected that successful candidates will commence graduate studies from **September 1, 2019**.

Project description

Harrison Blade Solutions has developed a high-lift device called a “droop” that affixes to the leading edge of a wind turbine. It is designed to combat ice accretion, increase the rotor power, and improve the durability of the turbine blades. How the droop impacts the aerodynamic performance of the turbine rotor must be investigated and validated. The Masters student will use CFD simulations and experiments on a 3 kW turbine to identify how the droop modifies the aerodynamic performance for a range of parent airfoil shapes and operating conditions. The simulations will be conducted using low-order methods such as XFOIL as well as higher-fidelity Reynolds-averaged Navier Stokes simulations and possibly large eddy simulations. Special attention will be given to low-wind conditions to identify whether the droop can improve the cut-in speed of the turbine. How the droop affects ice accretion will also be investigated. The experiments will be conducted using the industrial partner’s 3 kW wind turbine apparatus. CFD simulations will be conducted using a combination of commercial, open-source, and in-house CFD software on national high-performance computing facilities.

Training and professional development

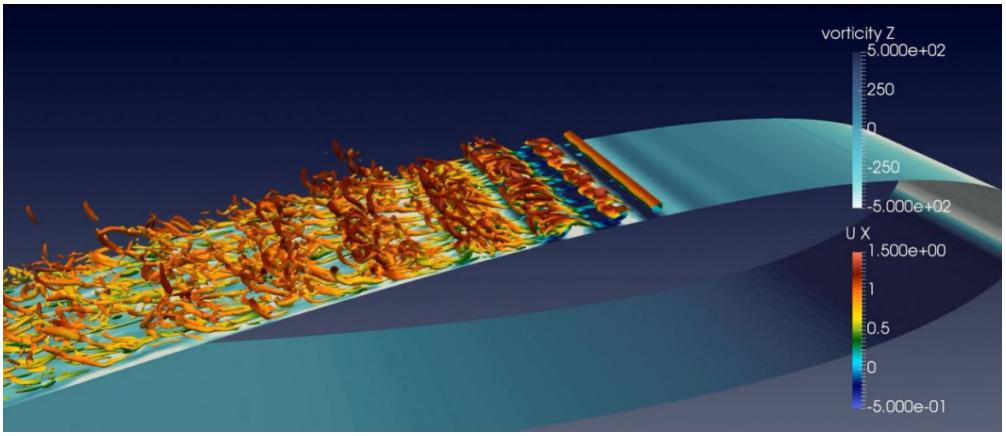
Candidates will receive high-quality formal and informal training in the following areas: (1) applied aerodynamics in wind energy systems (2) computational fluid dynamics; (3) experimental aerodynamics; (4) high performance computing. Candidates will have opportunities to participate in peer-reviewed publications as well as present at national and international conferences. Candidates may also optionally engage in an international exchange with Dr. Brinkerhoff’s extensive network of international collaborators; past students have visited labs in Australia, UK, and Spain to broaden their training and engage with world-leading research groups abroad.

Application procedure

Candidates are asked to submit:

- A cover letter describing their research interests and motivations for graduate study
- A detailed curriculum vitae highlighting their educational and professional achievements
- A list of three professional and/or academic references
- Unofficial transcripts from their Bachelors degree
- English test scores (if required)

Interested candidates should send the above documents and direct queries to Dr. Joshua Brinkerhoff (joshua.brinkerhoff@ubc.ca). Additional information of Dr. Brinkerhoff's research is available from his research webpage: http://okcfd.sites.olt.ubc.ca/.



CFD results illustrating laminar-to-turbulent transition on a wind turbine airfoil