Seminar

Wind Turbine Aerodynamics: Some history and some recent advances

Presenter: David Wood
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Monday, July 13th at 1pm
Room: MecE 2-3

Abstract

This talk will begin by describing the massive and under-rated contributions of the Russian scientist Nicholai Joukowsky to aerodynamics in general, and wind turbine aerodynamics in particular.

He was entirely responsible for introducing the Kutta-Joukowsky theorem in 1906, probably the most famous equation in aerodynamics. He derived the Betz limit for wind turbine power before Betz published it in 1920, and was instrumental in developing the mathematical methods to deal with very difficult helical trailing vortices in the wakes of wind turbines and propellers. I will then jump to the present to describe modern developments of the optimization theories of Betz, Goldstein, and Glauert, especially at low tip speed ratio. The talk will finish by describing the direct calculation of wind turbine tip loss using the methods pioneered by the Japanese scientist Kawada in 1936 and also subsequently forgotten.

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Seminar

Biography

David Wood has been the NSERC/ENMAX Professor of Renewable Energy at the University of Calgary since 2010. Previously he owned a company, Aerogenesis, that developed small wind turbine technology which he started after many years teaching at the University of Newcastle in Australia. He obtained his bachelors and masters degrees in Mechanical Engineering at the University of Sydney and his PhD in aeronuatics from Imperial College, London. He is an editor of the journal Wind Engineering, and a member of the editorial board of Renewables: Water, Wind and Solar, a new Springer on-line journal. His book Small Wind Turbines was published by Springer in 2011.