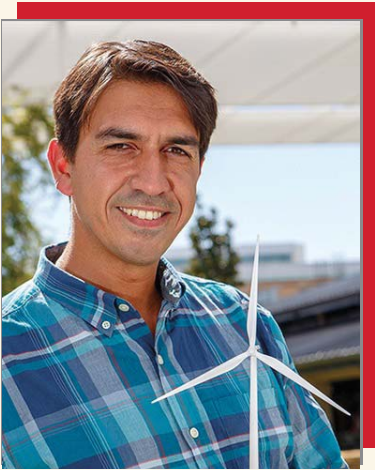


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Proactive monitoring of wind farms for maximization of power harvesting: lidar measurements and data-driven reduced order models



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ABSTRACT:

Prediction of power harvesting from a turbine array is characterized by a large degree of uncertainty, which is connected with the turbulent nature of the atmospheric boundary layer and complex turbine wake interactions. During this seminar a multi-faceted process for prediction of wind turbine wakes and wind power production is presented. This research approach is primarily based on an in-depth characterization of the physical phenomena underpinning wind turbine wakes through lidar measurements. Then, efficient algorithms for prediction of wind turbine wakes are tuned base on the experimental dataset. Calibration of the numerical models and design of the measurement procedures are synergistically performed in order improve accuracy in wake prediction. High fidelity is achieved via data-assimilation, while low computational costs of the numerical models is a strategic feature for real time monitoring, control and optimization of wind farms.

BIOGRAPHY:

Giacomo Valerio Iungo graduated in 2003 with full honors in Aerospace Engineering at the University of Pisa, Italy, and in 2007 he obtained a Ph.D. in Aerospace Engineering from the same institution (in collaboration with the CSIR, Pretoria, Rep. South Africa). The main topic of his doctoral research was the study of vortex-induced fluctuations produced by different bluff bodies. After, as Post-doctoral researcher at the Univ. of Pisa, he worked in the domains of wind engineering, road vehicle aerodynamics and subsonic wind tunnel design. The contribution of his research activity was recognized by the special mention for the 2010 IAWE-ANIV prize as best Italian junior researcher in wind engineering. In the period 2010-2014 he was scientist at EPFL, where he performed research in the field of wind energy, particularly devoted to the characterization and modeling of wind turbine wakes. Since September 2014 he is Assistant Professor at the University of Texas at Dallas. As principal investigator of the WindFluX Lab, he is actively working in the wind energy domain in order to develop state of the art facilities, such as a boundary layer wind tunnel and a mobile wind LiDAR platform, and developing algorithms for optimization of wind farm performance .