

Abstract Submitted
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The Ultimate Flow Controlled Wind Turbine Blade Airfoil AVRAHAM SEIFERT, DANNY DOLGOPYAT, ORI FRIEDLAND, LIOR SHIG, Tel Aviv Univ — Active flow control is being studied as an enabling technology to enhance and maintain high efficiency of wind turbine blades also with contaminated surface and unsteady winds as well as at off-design operating conditions. The study is focused on a 25% thick airfoil (DU91-W2-250) suitable for the mid blade radius location. Initially a clean airfoil was fabricated and tested, as well as compared to XFoil predictions. From these experiments, the evolution of the separation location was identified. Five locations for installing active flow control actuators are available on this airfoil. It uses both Piezo fluidic (“Synthetic jets”) and the Suction and Oscillatory Blowing (SaOB) actuators. Then we evaluate both actuation concepts overall energy efficiency and efficacy in controlling boundary layer separation. Since efficient actuation is to be found at low amplitudes when placed close to separation location, distributed actuation is used. Following the completion of the baseline studies the study has focused on the airfoil instrumentation and extensive wind tunnel testing over a Reynolds number range of 0.2 to 1.5 Million. Sample results will be presented and outline for continued study will be discussed.

Avraham Seifert
Tel Aviv Univ

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