Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

The effect of blade pitch in the rotor hydrodynamics of a cross-flow turbine.[1] MIGUEL SOMOANO, FRANCISCO HUERA-HUARTE, Universitat Rovira i Virgili — In this work we will show how the hydrodynamics of the rotor of a straight-bladed Cross-Flow Turbine (CFT) are affected by the Tip Speed Ratio (TSR), and the blade pitch angle imposed to the rotor. The CFT model used in experiments consists of a three-bladed (NACA-0015) vertical axis turbine with a chord (c) to rotor diameter (D) ratio of 0.16. Planar Digital Particle Image Velocimetry (DPIV) was used, with the laser sheet aiming at the mid-span of the blades, illuminating the inner part of the rotor and the near wake of the turbine. Tests were made by forcing the rotation of the turbine with a DC motor, which provided precise control of the TSR, while being towed in a still-water tank at a constant Reynolds number of 61000. A range of TSRs from 0.7 to 2.3 were covered for different blade pitches, ranging from 8° toe-in to 16° toe-out. The interaction between the blades in the rotor will be discussed by examining dimensionless phase-averaged vorticity fields in the inner part of the rotor and mean velocity fields in the near wake of the turbine.

[1]Supported by the Spanish Ministry of Economy and Competitiveness, grant BES-2013-065366 and project DPI2015-71645-P.

Miguel Somoano
Universitat Rovira i Virgili

Date submitted: 31 Jul 2016 Electronic form version 1.4