

Wind tunnel testing of the DeepWind demonstrator in design and tilted operating conditions - DTU Orbit (08/11/2017)

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The DeepWind Project aims at investigating the feasibility of a new floating vertical-axis wind turbine (VAWT) concept, whose purpose is to exploit wind resources at deep-water offshore sites. The results of an extensive experimental campaign on the DeepWind reduced scale demonstrator are here presented for different wind speeds and rotor angular velocities, including also skewed flow operation due to a tilted rotor arrangement. To accomplish this, after being instrumented to measure aerodynamic power and thrust (both in streamwise and transversal directions), a troposkien three-bladed rotor was installed on a high precision test bench, whose axis was suitable to be inclined up to 15° with respect to the design (i.e. upright) operating condition. The experiments were performed at the large scale, high speed wind tunnel of the Politecnico di Milano (Italy), using a "free jet" (open channel) configuration. The velocity field in the wake of the rotor was also fully characterized by means of an instrumented traversing system, to investigate the flow distribution downstream of the test section. Special care is taken in the description of the experimental set-up and of the measured data, so that the present results can be used as a benchmark for the validation of simulation models.

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