

EXPERIMENTAL AND CFD ANALYSIS OF THE FLOW IN THE WAKE OF A VERTICAL AXIS WIND TURBINE

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Key Words: *Vertical axis wind turbine; Flow visualization; CFD.*

In the last years, the studies of vertical axis wind turbine (VAWT) have advanced to develop of new turbines. The aim of this study is the experimental and numerical analysis of the flow around small-scale model of vertical axis wind turbine in an open-jet wind tunnel. The study will be focused on the wake of the turbine, the influence of the flow between the blades and the perturbations in the flow caused by the vertical axis. In this study, a drag-turbine was chosen and made by KLIUX Energies company, Figure 1. The experimental and Computational Fluid Dynamics (CFD) results will be compared to validate and optimize the turbine.

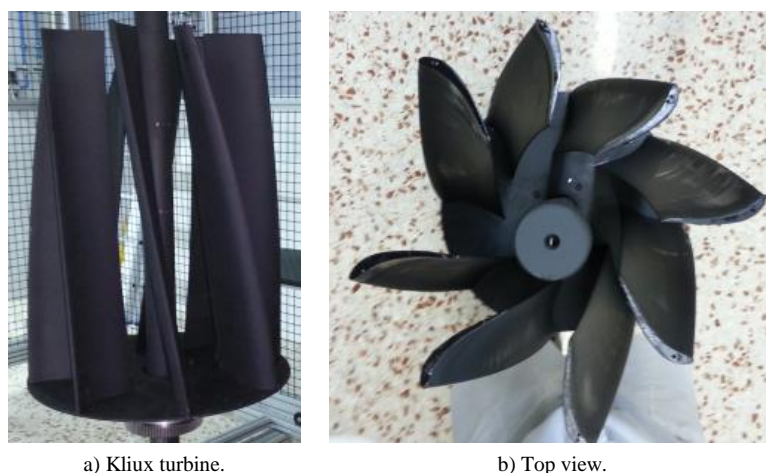


Figure 1. Kliux turbine images.

The experimental results allow us to determine the influence of the instantaneous flow structures generated in the wake of the blades and the axis on the overall performance of the turbine. This information is essential to determine strategies oriented to optimize the performance and create an experimental database to validate and tune numerical simulations of the flow around the turbine. The contrast smoke visualization is the technique chosen [1, 2]. Smoke structures are shown in Figure 2.

In order to obtain the best accuracy of the results, mesh independence test is performed in the 2D CFD [3, 4]. Figure 3 shows the results obtained by CFD simulations. The experimental results are validated with numerical results [5].

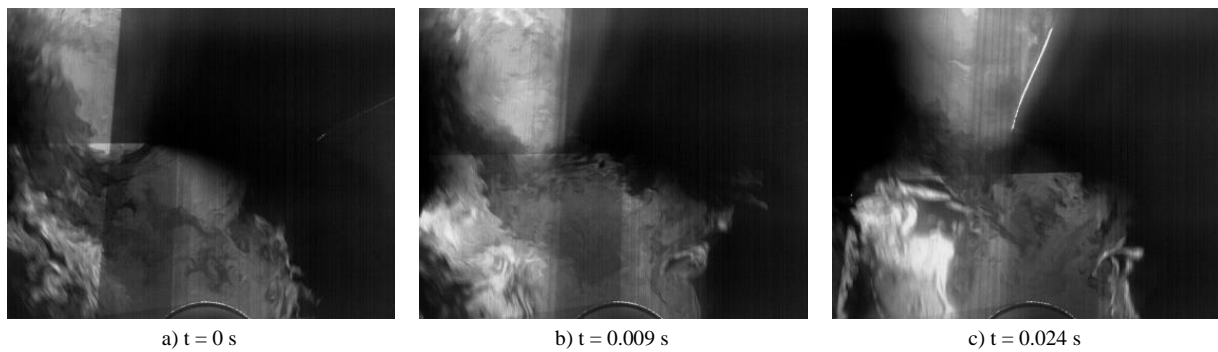


Figure 2. Smoke visualization inside turbine.

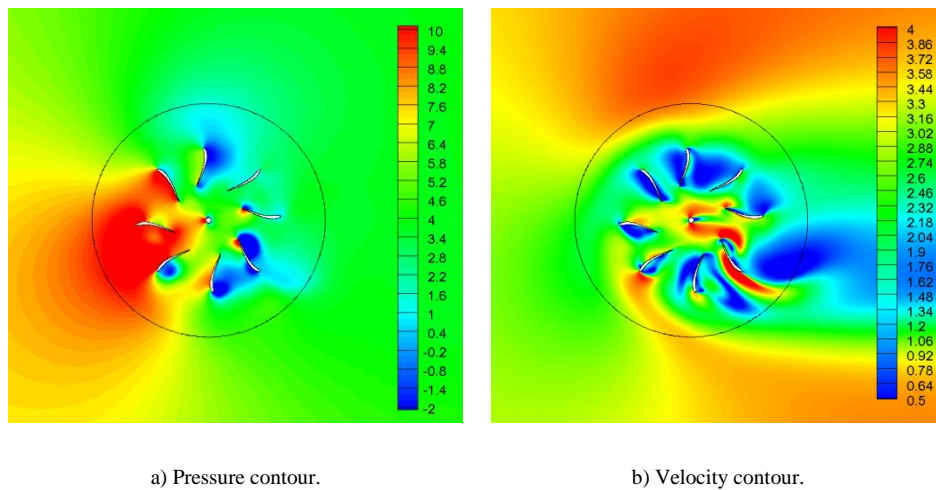


Figure 3. CFD simulations.

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