

Flow Control on a Horizontal Axis Research Wind Turbine in a Wind Tunnel

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The goal of ongoing research is to investigate load alleviations methods on the Berlin Research Turbine (BeRT). BeRT was designed, constructed and set up in the 4.2 m x 4.2 m wind turbine test section of the TU Berlin large wind tunnel. All data acquisition and control hardware is installed inside the rotating system. This unique facility is the first German load control research turbine in a wind tunnel with the advantages of high availability and low operational costs which are optimal properties for scientific studies.

A novel measurement technique called SmartViz was applied where a quantitative tuft flow visualization technique was synchronized with time resolved pressure and vibration measurements. With this technique, an arbitrary measured variable (e.g. pressure) can be linked to an instantaneous surface flow field on the rotor blades. It is possible to capture the complete rotor in one image, with all three blades equipped with flow tufts and image registration markers (Figure 1). This method is very helpful for analyzing unsteady flow phenomena and loads on wind turbine blades.

In the full paper results from load control experiments using three servo actuated flaps at the outer part of one blade will be presented.

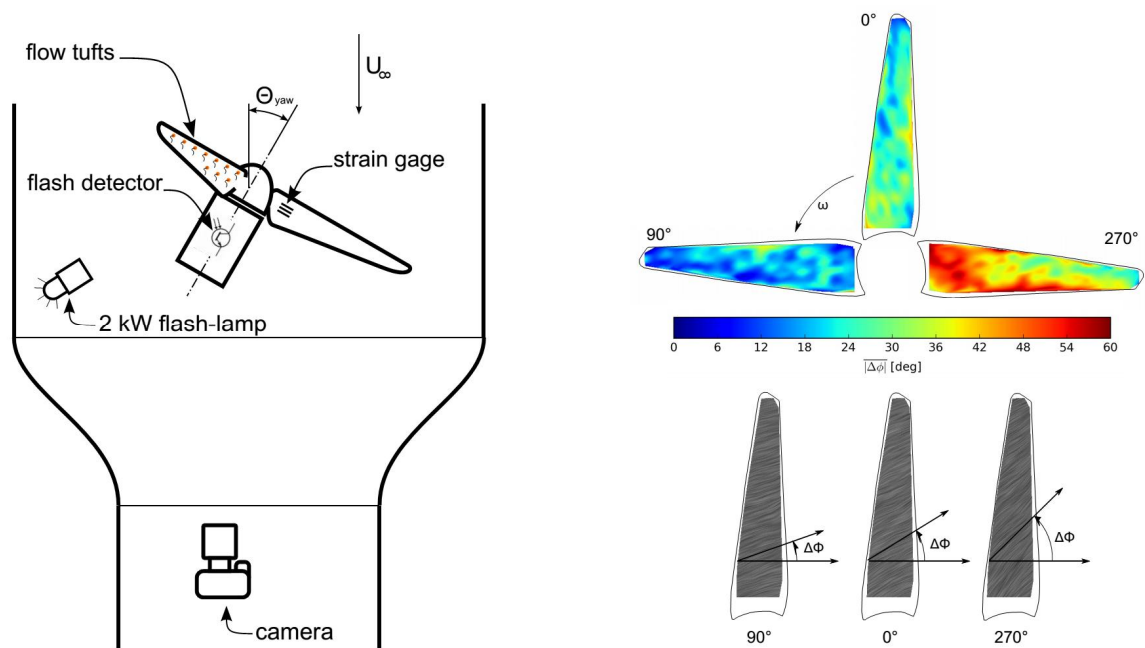


Figure 1: left: BeRT in the wind tunnel; right: Result from SmartViz

References

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