Experimental investigation of the wake behind a model of wind turbine in a water flume - DTU Orbit (18/12/2018)

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The flow behind the model of wind turbine rotor is investigated experimentally in a water flume using Particle Image Velocimetry. The study carried out involves rotors of three bladed wind turbine designed using Glauert’s optimization. The transitional regime, generally characterized as in between the regime governed by stable organized vortical structures and the turbulent wake, develops from disturbances of the tip and root vorticies through vortex paring and further complex behaviour towards the fully turbulent wake. Our PIV measurements pay special attention to the onset of the instabilities. The near wake characteristics (development of expansion, tip vortex position, deficit velocity and rotation in the wake) have been measured for different tip speed ratio to compare with main assumptions and conclusions of various rotor theories.

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Contributors: Okulov, V., Naumov, I., Kabardin, I., Mikkelsen, R. F., Sørensen, J. N.
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