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Wake evolution and trailing vortex instabilities YLVA ODEMARK, JENS H.M. FRANSSON, KTH Royal Institute of Technology — The production losses and inhomogeneous loads of wind power turbines placed in the wake of another turbine is a well-known problem when building new wind power farms, and a subject of intensive research. The present work aims at developing an increased understanding of the behaviour of turbine wakes, with special regard to wake evolution and the stability of the trailing vortices. Single point velocity measurements with hot-wire anemometry were performed in the wake of a small-scale model turbine. The model was placed in the middle of the wind tunnel test section, outside the boundary layers from the wind tunnel walls. In order to study the stability of the wake and the trailing vortices, a disturbance was introduced at the end of the nacelle. This was accomplished through two orifices perpendicular to the main flow, which were connected to a high-pressure tank and two fast-switching valves. Both varicose and sinusoidal modes of different frequencies could be triggered. By also triggering the measurements on the blade passage, the meandering of the wake and the disturbance frequency, phase averaged results could be computed. The results for different frequencies as well as studies of wake evolution will be presented.

Ylva Odemark
KTH Royal Institute of Technology

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