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Influence of pitch motion on the turbulent mixing in the wake of floating wind turbine models STANISLAV ROCKEL, JOACHIM PEINKE, MICHAEL HOELLING, ForWind - Institute of Physics, University of Oldenburg, Germany, RAÚL BAYOÁN CAL, Portland State University — Offshore wind turbines use fixed foundations, which are economical in shallow water up to a depth of 50m. For deeper water areas floating support structures are feasible alternatives. The added degrees of freedom of a floating platform introduce additional oscillations to the wind turbine and therefore influence the aerodynamics at the rotor and its wake, respectively. The influence of platform pitch motion on the wake of an upstream wind turbine and a turbine positioned in the wake is investigated. Wind tunnel experiments were performed using classical bottom fixed wind turbine models and turbines in free pitch motion. Using 2D-3C particle image elocimetry (SPIV), wakes of both turbines were measured. In both cases - fixed and pitching - the inflow conditions were kept constant. The differences in the turbulent quantities of the wake of the upwind turbine for the fixed and oscillating case are investigated and their influence the wake of the downwind turbine. Our results show that platform pitch and oscillatory motions of the wind turbine have a strong impact on the shape of the fluctuating components of the wake. Also the turbulent mixing is changed by the oscillations, which is transferred to statistical quantities of higher order in the wake of the downwind turbine.

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