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The Fluid Physics Challenges of Offshore Wind Plants MATTHEW LACKNER, SAMUAL ROACH, HANNAH JOHLAS, DAVID SCHMIDT, University of Massachusetts Amherst — The fluid physics of offshore wind plants offer unique challenges that distinguish them from onshore wind plants. Offshore wind plants developed in the coming decade are likely to have enormous spatial scales compared to onshore plants, with hundreds of turbines operating, each with rotor diameters exceeding 200 m. In this talk, several the fluid physics challenges for offshore wind plants will be discussed, including modeling, simulation, and measurement challenges. These include: the interaction between the atmospheric flow physics and the wind plant, which spans the mesoscale and microscale and creates significant numerical modeling challenges; the prevalence of extreme events such as hurricanes, with unique flow physics that produce wind conditions that differ fundamentally from normal operation; the role of wind turbine wakes and their impact on wind plant performance, as well as plant to plant interactions; the complex unsteady aerodynamics of floating wind turbines, which experience dynamic platform motion.

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