

Using modeling to support control design and testing for wind energy systems

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In this talk, I will describe how modeling is used to support control design and testing for wind energy systems, including both individual turbines and wind farms. Modeling for controller design includes both development of dynamic control-oriented models that can support closed-loop wind farm control with a wide variety of objectives and the development and use of simulation models for controller tuning and testing. I will then give examples of wind turbine and wind farm control design research, starting with the multi-institutional design of a 50-MW Segmented Ultralight Morphing Rotor wind turbine, which requires scaling up from existing designs and scaling down for a planned field demonstrator. My last examples will be related to wind farm control, including an overview of the challenges and opportunities and brief examples of ongoing research.