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THE LONG-TERM INFLOW AND STRUCTURAL TEST PROGRAM^{*†}

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ABSTRACT

The Long-term Inflow and Structural Test (LIST) program is collecting long-term, continuous inflow and structural response data to characterize the extreme loads on wind turbines. A heavily instrumented Micon 65/13M turbine with SERI 8-m blades is being used as the first test turbine for this program. This turbine and its two sister turbines are located in Bushland, TX, a test site that exposes the turbines to a wind regime that is representative of a Great Plains commercial site. The turbines and their inflow are being characterized with 60 measurements: 34 to characterize the inflow, 19 to characterize structural response, and 7 to characterize the time-varying state of the turbine. The primary characterization of the inflow into the LIST turbine relies upon an array of five sonic anemometers. Primary characterization of the structural response of the turbine uses several sets of strain gauges to measure bending loads on the blades and the tower and two accelerometers to measure the motion of the nacelle. Data from the various instruments are sampled at a rate of 30 Hz using a newly developed data acquisition system that features a time-synchronized continuous data stream that is telemetered from the turbine rotor. The data, taken continuously, are automatically divided into 10-minute segments and archived for analysis. Preliminary data are presented to illustrate the operation of the turbine and the data acquisition and analysis system.

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