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**MODAL TESTING OF A ROTATING WIND TURBINE**

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**ABSTRACT**

A testing technique has been developed to measure the modes of vibration of a rotating vertical axis wind turbine. This technique has been applied to the Sandia 2-m turbine, where the changes in individual modal frequencies as a function of the rotational speed have been tracked from 0 rpm (parked) to 600 rpm. During rotational testing, the structural response was measured using a combination of strain gages and accelerometers, passing the signals through slip rings. Excitation of the turbine structure was provided by a scheme that suddenly released a pretensioned cable, thus plucking the turbine as it was rotating at a set speed. In addition to calculating the real modes of the parked turbine, the modes of the rotating turbine were also determined at several rotational speeds. The modes of the rotating system proved to be complex because of centrifugal and Coriolis effects. The modal data for the parked turbine were used to update a finite element model. Also, the measured modal parameters for the rotating turbine were compared to the analytical results, thus verifying the analytical procedures used to incorporate the effects of the rotating coordinate system.

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