

Aeroelasticity of a Wind Turbine using AcuSolve and Abaqus

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Instabilities associated with aero-elastic behaviour of wind turbines can lead to catastrophic failure. As turbine outputs increase, so do blade diameter and blade flexure, especially at the tips. Predictive capabilities using simulation software is a must, given the limitations of available test sites and the desire to expose the turbines to potentially more extreme wind conditions/loading that can occur with offshore installations.

An analysis procedure starting from the CAD of the wind turbine blade model has been developed enabling a transient, three dimensional model to simulate Fluid Structure Interaction (FSI). The model utilized the AcuSolve CFD software (Computational Fluid Dynamics) to predict the fluid forces/loading on the blade and the Abaqus structural software to predict the displacements of the blades under the fluid loading and rotational forces.