

Fluid-Structure Interaction Analysis of the Interference Effect between Wind Turbine Blades and Tower

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Advanced numerical simulation of wind turbine aerodynamics has become an important field of research in recent years. In the current work, we present a 2D fluid-structure interaction (FSI) analysis of wind turbine blades in interference with the turbine tower. The fluid flow is computed using the finite volume method, and the structure field is solved by employing the finite element method. For the FSI computation a two-way iteratively coupled implicit method based on the partitioned coupling scheme is employed. Numerical results of the interference effect are presented, including the analysis of lift and drag coefficients of the wind turbine blade for different pitch angles of the blade. The computation is carried out using standard rotor blades and NACA profiles at operational rotor and wind velocities, as well as to a realistic scale of the structure.

Keywords: FSI analysis, Wind Turbine, Blade-Tower Interference, Pitch control