

# One-Way Fluid-Structure Interaction Simulation of an Offshore Wind Turbine

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## Abstract

The Fluid-Structure Interaction (FSI) has gained great interest of scholars recently, meanwhile, extensive studies have been conducted by the virtue of numerical methods which have been implemented on wind turbine models. The blades of a wind turbine have been gained a deep insight into the FSI analyses, however, few studies have been conducted on the tower and nacelle, which are key components of the wind turbine, using this method. We performed the one-way FSI analysis on a 2-MW offshore wind turbine, using the Finite Volume Method (FVM) with ANSYS CFX solver and the RNG k- $\epsilon$  turbulence model, to achieve a comprehensive cognition of it. The grid convergence was studied and verified in this study, and the torque value is chosen to determine the optimal case. The superior case, which was chosen to conduct the FSI analysis, with a relative error is only 2.15%, thus, the accuracy of results is credible.

**Keywords:** fluid-structure interaction, offshore wind turbine, RNG k- $\epsilon$  turbulence model, grid convergence

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