

# Two-way Fluid-Structure Interaction Simulation of a Micro Horizontal Axis Wind Turbine

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## Abstract

A two-way Fluid-Structure Interaction (FSI) analyses performed on a micro horizontal axis wind turbine (HAWT) which coupled the CFX solver with Structural solver in ANSYS Workbench was conducted in this paper. The partitioned approach-based non-conforming mesh methods and the k- $\epsilon$  turbulence model were adopted to perform the study. Both the results of one-way and two-way FSI analyses were presented and compared with each other, and discrepancy of the results, especially the mechanical properties, were analysed. Grid convergence which is crucial to the results was performed, and the relationship between the inner flow field domain (rotational domain) and the number of grids (number of cells, elements) was verified for the first time. Dynamical analyses of the wind turbine were conducted using the torque as a reference value, to verify the rationality of the model which dominates the accuracy of results. The optimal case was verified and used to conduct the study, thus, the results derived from the simulation of the FSI are accurate and credible.

**Keywords:** fluid-structure interaction, flow field domain, dynamical analyses, grid convergence

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