Actuator line/Navier–Stokes computations for the MEXICO rotor: comparison with detailed measurements - DTU Orbit (24/12/2018)

Actuator line/Navier–Stokes computations for the MEXICO rotor: comparison with detailed measurements

In the European collaborative MEXICO (Model Experiments in Controlled Conditions) project, a series of experiments was carried out on a 4.5 m diameter wind turbine rotor to validate numerical diagnostics tools. Here, some of the measured data are compared with computations of the combined actuator line/Navier–Stokes (AL/NS) model developed at the Technical University of Denmark. The AL/NS model was combined with a large eddy simulation technique and used to compute the flow past the MEXICO rotor in free air and in the DNW German-Dutch wind tunnel for three commonly defined test cases at wind speeds of 10, 15 and 24 m s −1. Two sets of airfoil data were used. Comparisons of blade loadings showed that the AL/NS technique with the modified airfoil data is in better agreement with the measurements than with the original 2D airfoil data. Comparisons of detailed near-wake velocities showed good agreement with the measurements. Computations including the influence of the geometry of the wind tunnel showed that tunnel effects are not significant and the effect of the geometry of the wind tunnel only results in a speedup of 3% at a thrust coefficient of CT = 1. Copyright © 2011 John Wiley & Sons, Ltd.
Scopus rating (2011): CiteScore 2.49 SJR 0.892 SNIP 2.582
Web of Science (2011): Impact factor 1.768
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.364 SNIP 2.026
Web of Science (2010): Impact factor 1.716
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 0.885 SNIP 1.439
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.743 SNIP 1.555
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.942 SNIP 1.42
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.586 SNIP 1.653
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.273 SNIP 0.827
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.525 SNIP 0.845
Web of Science (2004): Indexed yes
Web of Science (2003): Indexed yes
Web of Science (2002): Indexed yes
Web of Science (2001): Indexed yes
Web of Science (2000): Indexed yes
Original language: English
Keywords: Rotor aerodynamics, Wakes, Actuator line techniques, MEXICO rotor
DOIs:
10.1002/we.510
Source: dtu
Source-ID: n::oai:DTIC-ART:wiley/366592018::18003
Research output: Research - peer-review › Journal article – Annual report year: 2012