

Simulation of flowfields induced by wind blades based on a parallelized  
low-speed flow solver

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Abstract

In this study, a parallel computing technology is applied on the simulation of a wind turbine flow problem.

A third-order Roe type flux limited splitting based on a pre-conditioning matrix with an explicit time

marching method is used to solve the Navier - Stokes equations. The original FORTRAN code was parallelized

with Message Passing Interface (MPI) language and tested on a 64-CPU IBM SP2 parallel computer.

The test results show that a significant reduction of computing time in running the model and a superlinear

speed up rate is achieved up to 32 CPUs at IBM SP2 processors. The speed up rate is as high as 49 for

using IBM SP2 64 processors. The test shows very promising potential of parallel processing to provide

prompt simulation of the current wind turbine problems.

Keyword : Wind turbine, CFD, Pre-conditioning solver, Parallel computation