Computational Wind Engineering in Wind Power Generation

Are environmental and structural computational wind engineering applications better?
The most seminal contributions are examined,and their results are presented. It becomes clear that the engineering community has gained more benefits from environmentalthan structural computational wind engineering applications,mainly due to the usually less demanding computational needs for the former.

What is wind engineering?
Wind engineering is defined as 'the rational treatment of interactions between wind in the atmospheric boundary layer and man and his works on the surface of Earth'(Cermak,1975). Wind engineering,or Computational Wind Engineering (CWE),has come a long way. Fifty years ago,the present extent of achievements and applications in wind engineering could hardly have been imagined.

Can wind capturing structure be improved when multiple wind turbines are installed?
The aim of this work is to analyze the execution of wind capturing structure when multiples turbines installed in the venturi unit. It is possibleto increase the wind power for operating multiple wind turbines and to enhance the total power output of the system. 2 Inlet area and venturi cross-sectional area shows significant effect on speed ratio.

How efficient is wind energy utilisation?
Wind energy has received increasing attention in recent years due to its sustainability and geographically wide availability. The efficiency of wind energy utilisation highly depends on the performance of wind turbines, which convert the kinetic energy in wind into electrical energy.

How to maximize power generation in a wind turbine?
For maximum power generation,there are two principles to optimize the power generation in the wind turbine,which are as follows: (1) increase the mass flow rate of air and (2) increase the pressure drop across the turbine. After analysis,it is concluded that Diameter of venturi at throat decreases from 72 in in model 1 to 48 in in model 2.

Is numerical simulation a viable approach to turbine performance optimisation?
With the growth in turbine size,the experimental approach becomes increasingly unaffordable. With the rapid development of computer hardware and numerical algorithms in recent years,numerical simulation has become dominantin the performance optimisation for WTs,which reduces the development cycle significantly [14].

This book presents the state-of-the-art development in the field of computational intelligence applied to wind power systems by reviewing the most up-to-date work and representative practical problems collecting contributions from leading ...

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Wind energy is an effective and promising renewable energy source to produce electrical energy. Wind energy conversion systems (WECS) have been developing on a wide scale worldwide. ...

COMSOL is modern computational tool to design model and analysis of INVELOX system. 5 Numerical simulation and analysis of INVELOX wind turbine system have executed to find its advantages in terms of power ...

As global energy crises and climate change intensify, offshore wind energy, as a renewable energy source, is given more attention globally. The wind power generation system ...

There is always, a strong expectation from wind generation system to harness maximum power as well as to have good interaction with the grid. To satisfy the increasing ...

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