Computational Fluid Dynamics Simulations for Wind Turbines

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Message from the Guest Editors

Dear Colleagues,

Computational fluid dynamics (CFD) is a powerful tool to predict numerically liquid and gas flows in many industrial applications. Wind energy is a natural application of CFD where air flows around wind turbines and generates renewable energy by rotating the turbine blades.

Wind energy includes multiple scales of fluid flow phenomena, i.e., from the aerodynamics of turbine blades and wakes generated up to microclimate and atmospheric boundary layer weather conditions. Furthermore, different scales interact as atmospheric flows define wind conditions at a wind-farm scale and further down to a turbine scale.

CFD can be integrated with optimization algorithms in the search for optimal shape design or optimal control. Model-based optimization examples include, e.g., optimal design of blade geometry and micro-siting in complex terrain.

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Message from the Editor-in-Chief

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