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MULTISCALE SIMULATION OF WIND TURBINES INTERACTION WITHIN WIND FARMS AND WITH THE ENVIRONMENT

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en salle Joël Noilhan

Résumé :

Simulating the interaction among wind turbines, wind farms and the environment is a complex task due to phenomena spanning 6 orders of magnitude in spatial and temporal scales. The problem is commanded by the synoptic scale, but all the spatial scales down to the turbulent length scale have different levels of relevance too.

In this talk I will present the underway work at the Computational Simulation Center for Technological Applications (CSC-CONICET) of Argentina aiming at the study and simulation of different scales of the problem. We attempt to have a set of interchangeable models that could be combined with different accuracy and computational cost. The methodology chosen in each case will be commanded by the requirements of practical applications.
The strategy is based in a combination of : Numerical Weather Prediction (NWP) models,Computational Fluid Dynamic (CFD) simulations, Analytical wake models,Actuator {disk, line and surface} methods, Blade element momentum (BEM) methods, and Complex beam models for the deformable structures, like blades and towers.
I will present example results obtained by some of the techniques mentioned above, and how they compare with actual working situations in a wind farm in the Argentinean Patagonia.

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