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**CFD WAKE 1.0: WAKES IN COMPLEX TERRAIN AND OFFSHORE WITH CFD**

- CFD WAKE is a CFD wake model based on the actuator disk technique for wakes simulation in large wind farms, in complex terrain and offshore; where linear models usually underestimate wakes and overestimate power production.
- Similar input requirements to conventional wind resource assessment studies: rotor diameter, hub height and thrust curve.
- Simulation of the interaction between wakes and terrain through CFD.
- Merge of wakes in large wind farms.
- Specific mesh generation for the simulation of wakes with refinement at critical areas.
- Estimation of wind speed deficit and power production deficit for CFD wind resource assessment studies.
- Estimation of ambient and added turbulent intensity
- CFD WAKE has been successfully validated in the framework of the EU project UpWind (see references)

Turbulence intensity at hub height in complex terrain wind farms (ws= 6±0.5m/s, wd=270±2.5°)

Wind speed deficit at hub height in complex terrain wind farms (ws= 6±0.5m/s, wd=270±2.5°)

Validation of CFDWAKE power ratios along a row of wind turbines inside a complex terrain wind farm (ws= 6±0.5m/s, wd=270±2.5°)
- CFD WAKE simulates the evolution of wakes in challenging environments such as complex terrain and offshore sites, giving an accurate estimation of the net wind farm annual energy production.
- Wind farm layout optimization minimizing wake losses in complex terrain and offshore.
- Possibility of adding atmospheric stability effects.

**Validation of cfdwake**

Power ratios averaged for all rows in horns rev wind farm

\( WS = 6 \pm 0.5 \text{m/s, WD} = 270 \pm 2.5^\circ \)

**References:**


