

TITLE:

DWM

Wake analysis module for horizontal axis wind turbine dynamics analyses.

DWM is a module that has been developed and coupled into FAST wind turbine computer-aided engineering (CAE) tool to model the turbine wakes and to estimate the performance of the downwind waked turbines. DWM is applicable for both onshore and offshore horizontal axis wind turbines. The individual wake model of DWM is based on and developed from the Dynamic Wake Meandering (DWM) model.

The current version of DWM follows the requirements of the FAST Modularization Framework, couples to FAST 8, and is configured as a sub-module of AeroDyn. DWM can be applied to a row of wind turbines, or an entire wind farm with an arbitrary wind turbine layout and an arbitrary inflow wind direction. The outputs of DWM can be viewed directly from the native FAST outputs.

While FAST is simulating an upwind turbine, with the aid of AeroDyn, DWM is deployed to calculate the wake deficit velocity, the meandered wake center positions with respect to time, and the added turbulence intensity due to the presence of the wake mixing. While a downwind waked turbine is being simulated in FAST, the inflow wind to this waked turbine is modified based on the wake modeling results of its upwind turbines. Thus the effect of the wakes can be accurately reflected on the waked turbine according to its immediate wake.