The k-ε-fP model applied to wind farms

The recently developed k-ε-fP eddy-viscosity model is applied to one on-shore and two off-shore wind farms. The results are compared with power measurements and results of the standard k-ε eddy-viscosity model. In addition, the wind direction uncertainty of the measurements is used to correct the model results with a Gaussian filter. The standard k-ε eddy-viscosity model underpredicts the power deficit of the first downstream wind turbines, whereas the k-ε-fP eddy-viscosity model shows a good agreement with the measurements. However, the difference in the power deficit predicted by the turbulence models becomes smaller for wind turbines that are located further downstream. Moreover, the difference between the capability of the turbulence models to estimate the wind farm efficiency reduces with increasing wind farm size and wind turbine spacing. Copyright © 2014 John Wiley & Sons, Ltd.