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Interactive comment on "Design and Analysis of a Wake Steering Controller with Wind Direction Variability" *by* Eric Simley et al.

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The authors' investigations bring together previous studies on the yaw uncertainty and the uncertainty in the wind direction as well as wind direction dynamics in a meaningful way. These are decisive factors for the full-scale application of Wake Steering. The manuscript is logically structured and written understandably and the graphics are well explained in most cases (see note below). Therefore this paper is a good contribution to the field of application (and uncertainties in the application) of Wake Steering, which, although wake steering has been intensively studied for more than 10 years, has not been treated very much so far.

Nevertheless, I have a few small comments and questions, which I would like to list

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below:

RC1 page 1 line 16f: In the abstract 128 %, energy gain is announced. When reading the manuscript it becomes clear that this is the relative recovery of losses due to wake effects. The wording can be somewhat misleading here.

RC2 page 2 line 4f: The introduction begins with a description of wind farm control. Here one should be careful with this term. Wind farm control is usually something much more general, namely a power plant control, to comply with the grid codes. Yaw control usually belongs to the field of turbine control, and the advantages of coordinated yaw control on a wind farm level are only a "relatively" new subfield of wind farm control.

RC3 page 5 line 4f: Here it should be mentioned what kind of filter is used and, (if true) that it is also described in Bossanyi (2018).

RC4 page 5 line 5f: Why are you comparing the wind vane signal plus the nacelle position to the nacelle position and not just use the wind vane signal?

RC5 page 7 line 25: The acronym SOWFA is quite well known in the community and should be mentioned here.

RC6 page 11 line 4f: To avoid confusion please mention, that \delta is the Kronecker-Delta.

RC7 page12 line 1f: Which wind direction signal was used in the joint distribution in Fig. 7. The low-filtered wind direction or the "combined" wind direction?

RC8 page 13 Equation (9) For easier readability in the equations, I would advise to only italicize variables, as the ISO standard suggests. The I (in \hat\phi_I), FLORIS and the d of the integrator should be written in roman.

RC9 page 13 Section 3.3: Here the parameters for the uncertainty in the wind direction (x-axis Fig.8) and the yaw (y-axis Fig. 8) are tuned using the simulation. But in the simulation, the yaw uncertainty should either not exist or be adjustable. Can you explain

the result for the yaw uncertainty? Is it possible that the hysteresis of the Yaw controller and the Yaw process used in the simulation influences the parameterization?

RC10 page 16 Figure 10: The normalized power shown here is probably the sum of both turbines and not just the turbine downstream. This should be clearly stated.

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