Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2018-50-RC2, 2018

WIND ENERGY SCIENCE DISCUSSIONS

Interactive comment on "Robust active wake control in consideration of wind direction variability and uncertainty" *by* Andreas Rott et al.

Anonymous Referee #2

Received and published: 27 August 2018

Review of Journal: WES Title: Robust active wake control in consideration of wind direction variability and uncertainty Author(s): Andreas Rott et al. MS No.: wes-2018-50 MS Type: Research articles

The paper deals with wind farm control using yaw stearing and presents a methodology that takes the influence of uncertainty and variability of the wind direction passed to a wake model into account. Among other things it is demonstrated that the application of conventional optimization, where the wind direction is considered as a known input with a sharp value, in some cases may cause energy production to decrease rather than an increase.

The paper is well written, concise and focused, although the line of reasoning is not always clear (see comments below). I recommend the paper for publication with some

Printer-friendly version

Discussion paper

revisions and clarifications.

I am missing a discussion of the relation between the readings from a wind vane and the wind direction as a model input. For RANS types of models like FLORIS, the wind direction input is the ensemble mean value. This is NOT a stochastic variable, just a number with a sharp value - no matter how 'dynamic' the wind vane output looks. The Reynolds' decomposition takes care of fluctuations around the mean, so why is it relevant to use a distribution of inputs? You don't offer an explanation. I happen to agree with you that a single five (ten) minute average is insufficicient, although not for reasons you give me. At the same time I don't understand what you are trying to achieve by passing raw wind vane readings as model input.

There IS a statistical uncertainty on five minutes averages (used as estimates of abstract ensemble mean values). However, you study 5 minutes standard deviation (std) estimates of the wind vane data, which is not the same. What is the relevance in terms of model input uncertainty? The std is an upper bound on std of the average, but is it a good one?. You seem to assume that the std is an adequate measure of the robustness. Do you?, and if so why is the std an adequate measure? How should the robustness parameter be quantified?

The control algorithm in sec. 3.3 uses a prediction of the mean wind direction 5 minutes ahead. My guess is that the five minutes separation is a major source of uncertainty. The rms change between consequetive ten minutes averages of the wind direction is typically 5 degrees, a little less for 5 minutes. This could be used as a lower bound on the uncertainty. This can easily be derived from the met data (the pdf is double sided exponential).

Minor things:

'Without loss of generality'. This phrase is used in several places without justification. Please drop it and admit the loss.

Printer-friendly version

Discussion paper

figs 11 and 12. Popt/Pgreedy = 0.6% or was it 100.6% ? It is hard to see the differences between 11 and 12. The points melt together so that the density of points is lost. Perhaps smaller point size works better or maybe something different, like error bars?

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2018-50, 2018.