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Interactive comment on "Optimal closed-loop wake steering, Part 1: Conventionally neutral atmospheric boundary layer conditions" *by* Michael F. Howland et al.

Katherine Dykes (Editor)

kady@dtu.dk

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This review was submitted prior to the deadline but after the system closed.

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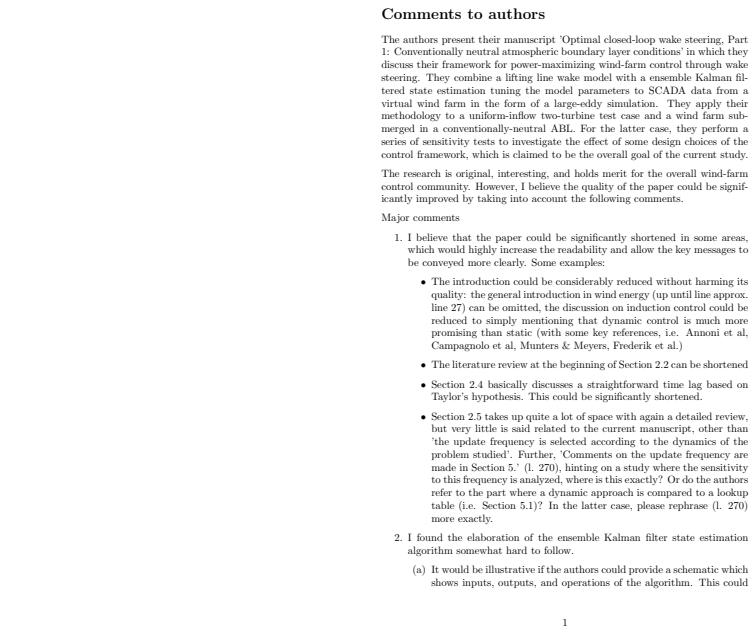
Discussion paper



Comments to authors

The authors present their manuscript 'Optimal closed-loop wake steering, Part 1: Conventionally neutral atmospheric boundary layer conditions' in which they discuss their framework for power-maximizing wind-farm control through wake steering. They combine a lifting line wake model with a ensemble Kalman filtered state estimation tuning the model parameters to SCADA data from a virtual wind farm in the form of a large-eddy simulation. They apply their methodology to a uniform-inflow two-turbine test case and a wind farm submerged in a conventionally-neutral ABL. For the latter case, they perform a series of sensitivity tests to investigate the effect of some design choices of the control framework, which is claimed to be the overall goal of the current study.

The research is original, interesting, and holds merit for the overall wind-farm control community. However, I believe the quality of the paper could be significantly improved by taking into account the following comments.

Major comments

1. I believe that the paper could be significantly shortened in some areas, which would highly increase the readability and allow the key messages to be conveyed more clearly. Some examples:
   - The introduction could be considerably reduced without harming its quality: the general introduction in wind energy (up until line approx. line 27) can be omitted, the discussion on induction control could be reduced to simply mentioning that dynamic control is much more promising than static (with some key references, i.e. Annoni et al, Campagnolo et al, Munters & Meyers, Frederik et al.)
   - The literature review at the beginning of Section 2.2 can be shortened
   - Section 2.4 basically discusses a straightforward time lag based on Taylor's hypothesis. This could be significantly shortened.
   - Section 2.5 takes up quite a lot of space with again a detailed review, but very little is said related to the current manuscript, other than 'the update frequency is selected according to the dynamics of the problem studied'. Further, 'Comments on the update frequency are made in Section 5.' (l. 270), hinting on a study where the sensitivity to this frequency is analyzed, where is this exactly? Or do the authors refer to the part where a dynamic approach is compared to a lookup table (i.e. Section 5.1)? In the latter case, please rephrase (l. 270) more exactly.
2. I found the elaboration of the ensemble Kalman filter state estimation algorithm somewhat hard to follow.
   (a) It would be illustrative if the authors could provide a schematic which shows inputs, outputs, and operations of the algorithm. This could

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Fig. 1.