

Interactive comment on “Real-time optimization of wind farms using modifier adaptation and machine learning” by Leif Erik Andersson and Lars Imsland

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Dear Leif,

Thank you for your article, I read it with much interest. An interesting topic is addressed: the application of machine learning in wind farms to improve surrogate models. I think the work presented itself is of good quality, and needs not much revision. However, I do think notable improvements can be made in how the work is presented. Please consider the following comments:

1. At large, the article seems to be heavily focused on the algorithm, and less so on the application. A large part of the paper is on explaining GPs and MA. Also, the results section contains a fairly large discussion on the number of training points

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and the computational cost. Though, what I am really missing is a more in depth discussion on wind farms. How would this algorithm be applied in wind farm control on real sites? What would you consider a training set in real life? Do you need to time averaged measurements? How would you deal with time-varying inflow conditions? Are time delays due to wake propagation an obstacle? You do not have to answer all these questions in this article, but you must acknowledge the relevant challenges for practical application and explicitly state the assumptions in your work. This would also shift the focus in your recommendations section to zoom out more – currently, most recommendations are on improving the algorithm, rather than the application.

2. I believe the article can be significantly reduced without a loss of scientific relevance or clarity. The MA and GP algorithms need not be discussed in detail, since they are presented in the literature elsewhere. The main things you must defend are your assumptions when applying these algorithms. I believe you can condense pages 3-6 into about 1.5 page, presenting the core contribution/application and leading to more clarity and a better focus in the article.

3. The literature survey presented in the introduction presents several high-quality articles. However, the current focus seems to be on general wind farm control. I believe it would be useful to shift the focus to surrogate modeling and model adaptation in wind farms. The article states that the two-step approach leads to suboptimal results. Are there publications that show this? What publications follow the two-step approach? Also, there is some work on using GPs in wind farm control already – it would be useful to cite this work instead.

4. I find it hard to keep oversight and focus when reading the article. Reducing the article's length and clearly stating the paper's contributions in the introduction will help address this. Also, it helps to start each section with one or two sentences relating the upcoming section to the previous section. Moreover, it may help to gather some information in tables, such as in the results section.

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Please see my detailed mark-ups in the attached .pdf. Note that I tend to be critical in my comments, and in no way do I mean to devalue your work. The comments are solely made to further improve the scientific relevance of the manuscript.

Please also note the supplement to this comment:

<https://www.wind-energ-sci-discuss.net/wes-2020-18/wes-2020-18-RC1-supplement.pdf>

Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2020-18>, 2020.

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