Wes 2020-86

Overall

- Overall, you have the makings of two good papers here and by shoving it into one paper, you are short-changing some of the depth in analysis on the different components. I would either expand in several areas or potentially cut some content and think about including it in a follow-on paper. For example, the complex terrain – since this is on wake steering, how much value does this add? Couldn't you do a whole additional paper looking at complex terrain and perhaps some application in either design or control? Sections 4.1 and 4.3 seem much more relevant since the main application targeted in this paper is on wake steering
- The model proposed is proposed as an alternative to 1) lower fidelity models (linear engineering models, linear rans (e.g. FUGA)), and 2) higher fidelity models (full steady RANS, etc) and is trying to hit a sweet-spot in terms of the capturing relevant physics at an acceptable computational cost for control and optimization applications. This is clear and articulated at some points in the paper but could be pulled out even more strongly and with more thorough comparison to the state of the art on the former in comparison to both alternatives.
- See more detailed comments by section

Abstract

- some of the results reporting is pretty vague. What does good agreement mean?
- When you say minimizes, that is an exaggeration. There are even simpler models that can do such simulations in fractions of a section
- Saying "about a second on a personal laptop" is vague
- Generally, was the minimization of time an explicit goal in the sense that you optimized aspects of the model parameterization for time minimization, or is it that you were seeking to implement a cost-efficient model that adequately accounts for wake deflection under steering. It seems like the latter is likely the goal and no explicit optimization of the modelling approach is done. It would be better to be explicit that the model is particularly advantageous for addressing specific flow phenomena (such as steering) that are a challenge for conventional engineering flow models…

Introduction

- Okay, I just read the first sentence of the introduction and got more out of that about what the paper is about than the entire abstract. I recommend rewriting the abstract
- Recommend modifying sentence line 18 – qualify minimizing computational cost. You are minimizing cost while doing what? Preserving physics?
- I would like to see a more thorough critique of superposition and where such methods are challenged. It is stated in the beginning that there are differences based on methods but differences aren't necessarily bad, it could be that the differences mean that one model is much better than another… how do they stack up in validation and where in particular are they challenged? Are they challenged more in wake steering compared to normal operating conditions?

- Overall point of paper “The curled wake solver presented in this work focuses on minimizing computational cost and capturing wake steering effects.” Should be introduction. Still here, I would not use the term minimize unless you are actively tweaking parameters in a scheme to explicitly minimize the cost while preserving some explicit level of accuracy in wake effects (i.e. the deficit and profile of the wake matches on some statistical factors with agreement of x%)

Formulation

- Can you be more explicit in what makes the curl floris standard so much slower? Also, how does it compare to engineering models like floris gaussian or others? Can you somehow quantify the performance of these different models in terms of a two-dimensional perspective on computational cost versus accuracy? The discussion at the end of section 3 seems somewhat incomplete and this is such an important contribution of the overall paper – I would like to see more attention paid to it. I think you are jumping to quickly to the case studies which are arguably less interesting in terms of the core contribution

Results

- Again, section 4.1 discussion seems somewhat incomplete. There is a lot of interesting stuff in the results and the plots are great, but there is so little discussion of the results and particularly the results across the different directions – which vary substantially.
- Okay, you are now killing me a little bit… there is so little analysis and discussion relative to the scope of the work being presented in 4.2!

Conclusions

- The conclusion is a better summary of the work than the present abstract
- Recommend considering updates to the conclusion following recommended updates in formulation in results section
- Consider discussing a bit more in depth the limitations of the current model and avenues for further work (as its own paragraph)