2020-66

Overall

- This is a really nice paper on a relevant and interesting topic and a good overall contribution. However, the overall framing is a bit weak. I would consider rewriting the abstract and thinking a bit more about what the key contributions of this paper are compared to the state of the art. They are stronger than the abstract indicates.
- Also, generally there is a lot of detail and in depth discussion but the paper lacks higher level synthesis which would be helpful at several key points in the paper (discussed in more detail below). Help the reader orient on the key takeaways throughout.

Abstract

- Why is the study framed as a comparison of geometric versus scaling to match key performance indicators? The issues associated with geometric scaling are widely understood. It does not seem a particularly strong way to frame the work

Introduction

- The list of questions seems ahead of itself. It would be better to start with the motivation for why we do scaling, how has it been done before and what are the challenges with doing so.
- Reference on the machine scaling past 200 m? references on reasons for upscaling? Reference on the square cubed law? There is lots of stuff out there so it would be good to reference something
- Subscaling motivations incomplete – there are a few key reasons for this:
    - Cost – with the size of turbines today, one cannot simply build a new concept for every interesting innovation idea
    - Control in testing – field testing is challenging because you cannot control the conditions and get the range of types of test conditions you might want. Wind tunnels offer the ability to replicate a broad range of conditions but you of course have to scale down the turbine model even for the largest wind tunnels in the world
- The discussion on the limitations of matching characteristics when subscaling to wind tunnel scale seems incomplete – what can and can not be matched? What trade-offs have to be made? And why can some of those be captured at the scale of the SWIFT field testing facility? – its addressed later so maybe mention that it will be
- V27 blade size and rated power worth mentioning since it is not self evident for those not familiar

Scaling

- Very nice overall discussion, before jumping into the subsections, could be nice to give a bit of a high-level overview (before the start of section 2.1)
- End of section 2 could also be stronger. The reader does not get a clear sense of the challenges and trade-offs in scaling. The anecdote on the nacelle is good but it would be stronger to use something tied to the blade design (for example – using the swift blades, or others)

Design strategies

- Why is the aerodynamic design problem focused on Cp error minimization as the objective function? Any of the performance metrics could be the objective and Cp matching could be a constraint… worth explaining choice
- This section could benefit from a brief additional subsection comparing and contrasting the geometric and aerodynamic design strategies on a theoretical basis.

10 MW subscaling

- Similarly here, a summary would be helpful – there is a lot of detailed information and there is a bit of a challenge seeing the forest for the trees

Performance comparison

- Consider a different title for section 5.2 – i.e. Load trends under waked conditions
- Section 5.2 is SUPER interesting and deserves a bit more discussion and prominence in the overall article… consider expanding on it and using as a key part of the overall framing and motivation for the paper

Conclusions

- Missing a decent recommendation on future work – for example, 5.2 looked at trends in loads from effects of upstream wakes, what about the control strategies applied on both upstream and downstream turbines?
- Also, there could be a bit more of circling back on the ties to issues of scaling with of atmospheric structures. Even if we can solve the turbine scaling issues, that is only part of the problem