

Wind Energ. Sci. Discuss., referee comment RC2
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Comment on wes-2021-141

Anonymous Referee #2

Referee comment on "Large-eddy simulation of airborne wind energy farms" by Thomas Haas et al., Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-141-RC2>, 2021

General comments:

- The article presents the combination of large-eddy simulation with a control theory model for ground-gen and fly-gen fixed wing airborne wind energy systems. There is a complex interaction between the different components of the model. Each component in the model is explained to a certain level in a dedicated section.
- The level of fidelity of the wind model is high, except for the relatively low grid resolution, while the model of the airborne wind energy system is very simplified.
- The control strategy uses the model with several constraints, among others to avoid flying in the own wake. It results in the generation of optimal trajectories.
- After explaining the model, results are presented for 3 different farm configurations. Wake effects are shown to be of importance. The fly-gen systems cause significantly stronger wakes than the ground-gen systems. In all farms, the flight path stays close to the optimal trajectories.
- The article is technically of a high level, uses a scientific method and is definitely relevant for the wind energy science community. The amount of information and the forward references make the article a challenge to read, but this is unavoidable given the amount of work that is presented.
- The open data will be an added value for the community.

Specific comments:

- Line 155: The authors state that fewer states and control variables result in a less computationally intensive model. However, is this reduction relevant compared to the computational cost of the LES calculations? Some information about the time spent in each component of the model would be an interesting addition.
- Line 209: The authors obtain the model-equivalent angle of attack from the

aerodynamic state, which is then used to define the orientation of the airborne wind energy system and as such influences the calculation of the aerodynamic forces. The authors had to do something to complete the limited information provided by the 3DOF model, and there is no obvious other way of doing this, but it remains a questionable approach in my opinion.

Technical corrections:

- Line 30: axissymmetric => axisymmetric
- Line 36: can not => cannot
- Line 98: N_s probably refers to the number of segments of the wing, but this is not mentioned explicitly.
- Line 260: eventual => if applicable
- Line 357: The "min" and "s.t." are aligned too much to the left.
- Line 405: The "min" and "s.t." are aligned too much to the left.
- Line 655: stremwise => streamwise
- Line 757: magnitude aerodynamic => magnitude of the aerodynamic
- Caption figure A4: Is there a precursor simulation in this case? Isn't it a turbulence-free, sheared inflow according to line 786?