Wind Energ. Sci. Discuss.,
https://doi.org/10.5194/wes-2018-56-RC2, 2018

eawe european academy of wind energy
Open Access WIND ENERGY SCIENCE DISCUSSIONS

Interactive comment on "Automatic Measurement and Characterization of the Dynamic Properties of Tethered Membrane Wings" *by* Jan Hummel et al.

Anonymous Referee #2

Received and published: 22 September 2018

1. Summary and Recommendation

The manuscript describes an automated test bench setup for measurements of flight properties of tethered wings. The system is build on a car trailer to be used in towing mode and features extended steering and measurement components. After an introduction, the quantities to be measured are introduced. Subsequently, the hardware setup is described in detail. After a brief section on data acquisition and testing procedure, flight test results are presented by comparing aerodynamic properties of five kites in static flight mode.

In general and in large part, the paper is well written, contains clear figures and provides detailed insights in the technical implementation of the setup. As these measurements are essential for the development of kites for airborne wind energy (AWE),

the manuscript is of broad interest for the AWE community. Thus, this clear and consistent presentation of the experimental setup can be clearly regarded as the main contribution of the paper. In contrast, the result section appears weak as only static flight at one wind speed is discussed which by far does not cover the operational range needed in AWE setups. However, rating the overall manuscript, the reviewer definitely recommends publication in WES. The discussion of the data and especially the outlook should undergo a (minor) rework in order to provide a clearer assessment of the experimental results achieved and future experiments needed to provide a full characterization of tethered wings for application in AWE. Please find details below.

2. Scientific questions and issues

- One big advantage of the setup is that the wind speed can be directly adjusted by just setting the cruising speed of the towing vehicle. Why are only results for one wind speed presented. Could you specify and discuss range of wind speeds which could be examined by this setup?

- AWE setups require a dynamic flight mode of the kites. How will dynamic flight test be implemented in the existing setup?

- The Abstract should be shortened. In parts, it resembles an introduction but should provide a condensed summary of the own work presented in the paper.

- The "Conclusion and Outlook" section has a partly confusing structure and should be reworked. In the first two sentences, it is stated, that "dynamic flight...was not feasible...is essential". Two sentences later, the authors claim that "...presented work fills this gap...". Subsequently a lot of issues are addressed but in arbitrary order in one long paragraph. Please state clearly what has been achieved. Then it would be nice to have a summary of future work to be required by AWE applications and a brief discussion of the ideas to extend the setup.

- the line sag is mentioned in the outlook, but shouldn't it be discussed in the error

analysis (3.3.3), especially for static depowered flight?

- are the errorbars in Figure 14 realistic as the C_L coefficient depends on wind speed, for which an error of 20% is assumed (3.3.2)?

3. Technical corrections

- consistent symbols should be used, e.g. for vectors (bold face on page 4 <-> overline on page 11)

Interactive comment on Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2018-56, 2018.