Response to Reviewer 2, Second Round

July 8, 2025

1. **It is difficult to interpret the significance of the parameters in Table B2. Could this table be accompanied by a dimensioned drawing to make things clearer for the reader?**

   Thank you for the suggestion. We believe that the existing drawings and sketches already provide sufficient context to interpret the parameters in Table B2. The KCU is modeled as a cylinder, and the distance between the KCU and kite is understood within the modeling framework as the distance between the point masses, since each component is modeled accordingly.

2. **The KCU in Figure 1 does not look like a cylinder of revolution. It therefore seems difficult to reduce its geometry to a 'diameter' and 'length' as shown in Table 2.**

   Thank you for the observation. The KCU in Figure 1 does not include the padding. Otherwise, it resembles more closely a cylinder. Please note that Figure 1 is only a representative illustration. The actual system is shown in Figure 2, where the KCU has a cylindrical cover. Nevertheless, we acknowledge the simplification and note that developing a model for a kite-specific KCU lies outside the scope of this paper.

3. **Furthermore, Figure 1 appears to represent the front and side views of the V3 wing with the bridle system and the KCU. However, the views are not checked for correspondence. The authors need to correct this figure to make it usable for the purposes of reproducibility of the results.**

   Thank you for pointing this out. Figure 1 is a conceptual illustration intended to visualize the setup and components of the kite system. It has been adapted from earlier publications (Oehler and Schmehl, 2019) and is not meant to serve as a technical drawing. For reproducibility purposes, we have added a citation in the figure caption referring to the open-source repository that contains all relevant geometry and measurement data of the V3 kite system.

4. **In the answer to the "Major Concern...", it is mentioned that the kite position and velocity come from the GPS. However, as there are 4 GPS and associated inertial units, the reader can wonder if the result comes from one single GPS or is it a weighted average of the 4 GPSs positions?**

   Thank you for this important clarification request. The number and placement of sensors for each dataset are already described in the results section. For the V3 system, we use the average of the two GPS units installed in the central strut. For the V9 system, only one GPS was typically installed; however, in one of the flights, two GPS units were placed on the central struts, and their positions were likewise averaged. We will clarify this explicitly in the results section.

5. **Are the four GPS relative positions defined based on measurements done on the ground directly on the real kite? Or does the author just rely on the theoretical design and dimension of the kite?**

   Thank you for the question. The datasets studied do not involve four GPS units. Each GPS measures absolute position relative to the ground station. This is already clarified in the results section.

6. **Are the variations in distance between the four boxes due to errors or to kite structure deformations?**

   Thank you for your observation. This is not applicable to the configurations used. The GPS units are not used to measure relative distances; they serve mainly for redundancy.

7. **L200–201: It seems that the definition of lift force forgot the contribution of inertia to the kite motion. Does that mean that the authors assumed it for negligible? This needs to be demonstrated since a priori the authors have the material to do so.**

   Thank you for the remark. Equation 4 defines the aerodynamic force. Inertial effects are included in the equations of motion (see Eq. 23), where the sum of all forces includes inertia. The aerodynamic force itself does not include inertial contributions.

8. **Figure 10(b): The curve for the IMU strut is practically invisible, especially in the bottom figure. Please use different markers and finer lines.**

   Thank you for pointing this out. We have added a note in the figure caption clarifying that the two IMU lines are nearly overlapping and may be difficult to distinguish.

9. **In the same figure, can you replace "aligned with v_a" by "v_a" for clarity? The same for v_k.**

   Thank you for the suggestion. We have updated the legend to use the notation $x_\mathrm{k} \parallel v_\mathrm{a}$ and $x_\mathrm{k} \parallel v_\mathrm{k}$, indicating alignment of the kite's body-fixed x-axis (heading) with either the apparent wind velocity or the kite's velocity, respectively. This provides a more concise and consistent representation in the plot.

10. **Lines 500–504: There is confusion with the use of the word "deformation". A modification in wing angle of attack does not necessarily result in deformation. It essentially results in a pitch solid rotation which is quite different.**

    Thank you for the insightful comment. We define the kite as the combination of wing and bridle system. A change in the local angle of attack due to actuation is interpreted as a deformation, since it does not involve rigid body pitch of the entire kite. The solid rotation refers to the bridle–wing assembly around the KCU. From the EKF, it is possible to isolate solid pitch rotation from local deformation, and this is used to estimate the angle of attack at the wing, defined at the central struts of the wing. A small clarification is added to the text.

11. **Lines 522–527: The definition of sag is still unclear to me. For clarity, the author should use Figure 4 to support visually what is "sag". In my mind "sag" is the maximum distance between the deformed tether and the straight line between the tether extremities. Given this definition, talking about negative sag makes no sense.**

    Thank you for pointing this out. In our work, what we initially referred to as "sag" is defined as the difference between the unstretched tether length and the radial distance (i.e., the straight-line distance between tether attachment points). Since this quantity can be negative in tensioned configurations, we acknowledge that the term "sag" may be misleading. We will revise the text to use the term "tether slack" instead and clarify the definition accordingly in the main text and figure.

12. **Line 549 (and others 591, 593. . .): It might be useful to cite references other than those from Delft.**

    Thank you for the suggestion. In this section, we specifically discuss kite configurations developed and studied at TU Delft. There are currently no other institutions with equivalent datasets or results for these specific systems.

13. **Lines 551–554: The text is unclear. It is necessary to specify which figure is being discussed. The comments should be more precise and clearer.**

    Thank you for pointing this out. We have revised the text to explicitly refer to Figure 14 and made the explanation more precise for improved clarity.

14. **Line 784: "A standard laptop" – can you give the main characteristics (RAM, cores, CPU, etc.)? A reference to Annex C2 may be sufficient.**

    Thank you. The hardware and software specifications of the standard laptop used for benchmarking are already provided in Appendix C2, and the reference was included in the text. To make this clearer, we have slightly adjusted the sentence to explicitly refer to Appendix C2 directly after mentioning the standard laptop.