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Interactive comment on "Ability of the e-TellTale sensor to detect flow features over wind turbine blades: flow stall/reattachment dynamics" *by* Antoine Soulier et al.

Antoine Soulier et al.

caroline.braud@ec-nantes.fr

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The technical comments will be taken into account directly in the article

Anonymous referee #2

The majority of the comments will be taken into account directly in the article

Here are a few complementary answers:

Q14 : You are thinking about wind turbines, but the measurements are for a straight foil section at small Re. So the present title is a bit misleading, I think. Also, the use of / should be avoided, specially in the title A14 : We agree with the reviewer, the title

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has been modified as follows: “ Low Reynolds investigations on the ability of the strip of e-TellTale sensor to detect flow features over wind turbine blade section: flow stall and reattachment dynamics”

Q15 : -l68 - what is the mean AOA during the pitching motion ?

A15 : We only have a relative measurement of the AoA (from PIV measurements). Prior to PIV acquisitions; wool tuft were placed chordwise and the AoA amplitude was chosen to include the stall angle.

Q16 : l118 - default>a non-identification l120 - So, you corrected the data-points for which the detection algorithm did not work, and set sxc to 1, and these correspond to the bluepoints in fig 5 ? Why ? It appears the unidentififed data-points occur when the flow is attached. According to fig 5, wouldnt it make sense to ‘correct’ these data-points to around sxc=0.75 ? A16: We have modified the sentence to be more clear. During stall the e-telltale may leave the field of view hence missing data points. To estimate the missing data, we use a crude estimation method, which is to replace the missing points with an arbitrary value (taken here to be equal to the minimum value encountered). It is likely that using the measured average value over the stall as suggested by the reviewer, would provide a better estimation of the missing values. However, tests for which this average value was replaced did not lead to significant changes in the detection times. The sentence has been replaced as follows: “During stall there is a significant amount of out of plan motions of the strip from the laser sheet. In those cases, the strip was not enlightened inducing missing values in sxp as can be seen in the figure 4c. These values were replaced by the maximum value of sx . The corrected signal, sxc , is presented with the original signal sx in the figure 5.” instead of : “Missing values present in the signal are related to default in the contour detection algorithm as can be seen in the figure 4c. These outliers are found to be correlated with AoA beyond stall, were 3D effects are dominants. These values were replaced by the minimum value of sx . The corrected signal, sxc , is presented with the original signal sx in the figure 5.”

Q17 : -Fig 7 - the a-i points were chosen based solely on visual inspection ? Of how many instantaneous snapshots ? It might explain why you found a consistent lag wrt the analytical stall and reattachment detection methods

A17 : Yes it is based only on visual inspection, on 2000 snapshots. The determination of the detection instants is likely to be affected by different factors, such as the exact threshold (signal mean) value, the length of the moving average window in the smoothing procedure, and the estimation procedure for missing data in the case of the strip contour detection method. It is therefore difficult to provide a reliable interpretation of the small differences observed between the different methods.

Q18 : l262 - is this 'dispersion' associated with turbulent structures in shear layers ? Please be specific

A18 : This dispersion is related to the variance of the signal. There is certainly a link with the turbulent structures in the shear layers, however the time resolution in this study is not enough high to investigate this point further and need a dedicated work which is out of the scope of the present paper.

Q19 : l313 - since it appears all stall detection methods are early wrt the visual reference,does it make sense to adjust the visual reference ?

A19 : As already pointed out in A17, the delay on the detected instants from the 3 detection methods is quantified relatively to the threshold and the smoothing method. It is true that it would make sense to adjust the visual reference. However we have not been able to determine a criterion that would allow us to do so a priori.

Q20 : Fig 23 - the fluctuations on the 'brut' signal appear to be of the same frequency as the sampling you are showing...and some of these higher frequencies are still seen with a moving average e=9.C3 Do you know what is the natural frequency of the telltale sensor ? This might have a crucial influence, and MUST be considered, for both laboratory and field experiment design

A20 : We agree with the reviewer that the time resolution of the signal is not enough to study these oscillations. Regarding the resonance of the strip, the material used has a resonance frequency that can't be extracted using standard methods (indentation, traction/compression ...). However, this natural frequency has been observed prior to measurements and avoided in these tests using another free stream velocity. This phenomena needs a complete characterization by itself that is out of the scope of the present paper.

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