Response to referee #1

General Comments

The topic of the manuscript for review, namely the characteristics of a novel device for the detection of flow separation and the onset of stall, is of relevance for the wind energy community. Different sensor setups and locations have been investigated in wind tunnel experiments at Re=885.000 for this purpose. The characterization of the sensor performance dependency on angle of attack is car- ried out mainly by comparison of the mean signal and its standard deviation. The presented results indicate the ability of the novel sensor to identify the onset of trailing edge separation and the stall angle. This ability is reduced in some configurations due to the position of the sensor. The presented experimental investigations provide interesting information about the sensor characteristics and possible limitations for certain use cases, depend- ing on sensor location. However, the description of the results could be improved by taking the detected pressure distribution into account in order to explain the sensor sensitivity differences at certain positions of the airfoil. These improve- ments can be easily done based on the already existing plots. I recommend this paper for publication after very minor
Response: We would like to thank the referee for taking the time to evaluate our manuscript. We took his comments into account which improved the quality of the manuscript.

Specific Comments

Referee: In section 3 (p. 8, line 104f) the authors mention, that transition from an attached to separated flow can be seen "from the intermittent appearance of a plateau on the pressure distribution". It is unclear, how the authors define this "intermittency", since only temporally and spatially averaged pressure distributions for two AoAs (6° and 8°) are plotted. One could argue, that for intermediade AoAs a gradual increase of the plateau is expected, rather than an intermitted occurence.
Response: This is true that we only provided the average value of the pressure distribution. For consistency with the presented results, the sentence has been replaced by:
"Between $AoA \simeq 6\,^\circ$ to $8\,^\circ$, the flow is transitioning from the attached state to the separated state (i.e. zero pressure gradient), as can be seen on the zoom of figure 9, where the mean pressure coefficient near the trailing edge is progressively increasing towards a plateau from $AoA = 6\,^\circ$"

Referee: In section 3 (p. 9, line 111f) the authors mention, that the flow separation location is "really close to the leading edge". An estimate in terms of chordwise location should be given based on the information from the pressure distributions.
Response: a chordwise location has been added.

Referee: On page 10, figure 10 is presented without any reference in the text. The only reference to figure 10 appears on page 14. The figure should be moved closer to the reference in the text or a reference / explanation in the text should be given close to its current position.
Response: Thank you for noticing. This figure is not comparing the TESL case with the reference case, it has thus no meaning in page 14 and the related sentence has been removed from the paragraph. With no reference in the document, the figure has been removed from the article.

Referee: In section 4.1 (p.11, lines 137ff) the authors describe the increase of the sensor signal in the AoA range of 5 ° to 8 ° , which is followed by decreasing "linearly" to 0. On the one hand, linearity is hard to conlcude from just three measurement points. On the other hand, the authors do not give any explanation or hypothesis for this unexpected behaviour. At least an attempt to reason this sudden reduction in signal value should be undertaken.
Response: Thank you for these remarks that were taken in to account together with a possible scenario

of what is happening as follows:
"From -5 ° to 5 °, the linear evolution of the lift indicates an attached flow state. For this AoA range, both the mean and the standard deviation of the signal of the e-Telltale are near 0. From 5 ° to 8 °, corresponding to the flow separation appearance at the trailing edge, both the mean and the standard deviation rise up with the AoA. Then from 8° to 10° they decrease to values near 0. It should be noticed that this behaviour is not present when the e-Telltale is located near the leading edge (LENSL, figure **??**), clearly indicating that this bump from 5° to 10° is associated to the location of the e-Telltale sensor in the trailing edge flow separation area. This suggests that, in that region, when the AOA is increasing from 5 ° to 8 °, the flow is departing from the wall causing movement of the e-TellTale strip outward the wall, thus increasing its signal. The separated flow should naturally induces a mean shear area with associated turbulent structures. This turbulent separated shear layer is supposedly fluctuating from the wall to the separated shear area, causing fluctuations of the e-Telltale strip (that was observed), increasing the RMS value of the e-Telltale sensor. Above 8 °, the separated shear layer is probably moving to far from the wall, getting out-of-reach of the e-TellTale strip length, which in turn reduces the mean and RMS value of the e-TellTale signal. More spatio-temporal informations are needed to confirm this scenario. Also, it should be noted that this scenario do not take into account potential fluid-structure interactions with the e-TellTale strip."

Referee: In section 4.1 (p.11, lines 140) the authors claim that the sensor is appropriate for the detection of TE flow separtion "at least for this type of profile". Which limitations on the usability would the authors expect, and for which other types of profile? What would be the benefit of a sensor, that can only be appropriately used for one type of profile? Although I don't expect significant limitations for typical wind energy profiles, the authors should give an explanation or argument once they raise this concern.
Response: For the blade shape tested, the flow separation starts at the trailing edge and then move progressively towards the leading edge with the increase of the angle of attack. The two states (trailing-edge separation and leading-edge separation) are clearly separated, and most of wind turbine blade shapes behave similarly. However, for thin airfoils used in aircraft applications for instance, a strong stall occurs just after the maximum lift value, with a very fast displacement of the separation from the trailing-edge to the leading edge. In that case the dynamic response of the E-TellTale sensor is of major importance. Also, the distance of the separated shear layer to the e-TellTale strip might be too far for a sensor located at the trailing edge.

This wasn't the good location to put some limitations the sensor. The sentence "at least for this type of profile" has been remove and we can now read in the conclusion:

"At last, the sensor might have some limitations when dealing with thin airfoils that have a strong stall just after the maximum lift value, with a very fast displacement of the flow separation from the trailing-edge to leading-edge. In that case the dynamic response of the sensor is of major importance and the best location might be rather near the leading-edge. Indeed, the sensitivity of the sensor to the separated shear layer when it is located at the trailing edge may rapidly disapear."

Referee: In section 4.3 the authors compare the signals of the sensor depending on location close to the TE or LE. Figure 13 (a and b) show strong increases of signal and standard deviation for the LE location once the AoA reaches the stall region. It would be of great benefit for the reader to relate the position of the sensor to the actual position of the flow separation as it can be concluded from the pressure distributions. An assumption would be, that the LENSL sensor is located upstream of the location of flow separation until AoA 18° . A comparison of sensor location and separation location would help to understand the reason for the low responsiveness in lower AoAs and the sudden signal increase afterwards, though.
Response: This is indeed the case. The link with the separation area is now clearly stated:

"This should be attributed to the separation location, where the zero mean pressure gradient starts, that is reaching the strip region, between 19 % to 31 % of the chord length, for angles of attack higher than 18 °."

Technical Comments

Response: Thank you for these corrections. All the technical issues were addressed.

Response to referee #2

Response: Thank you for these corrections. All the technical issues have been addressed.