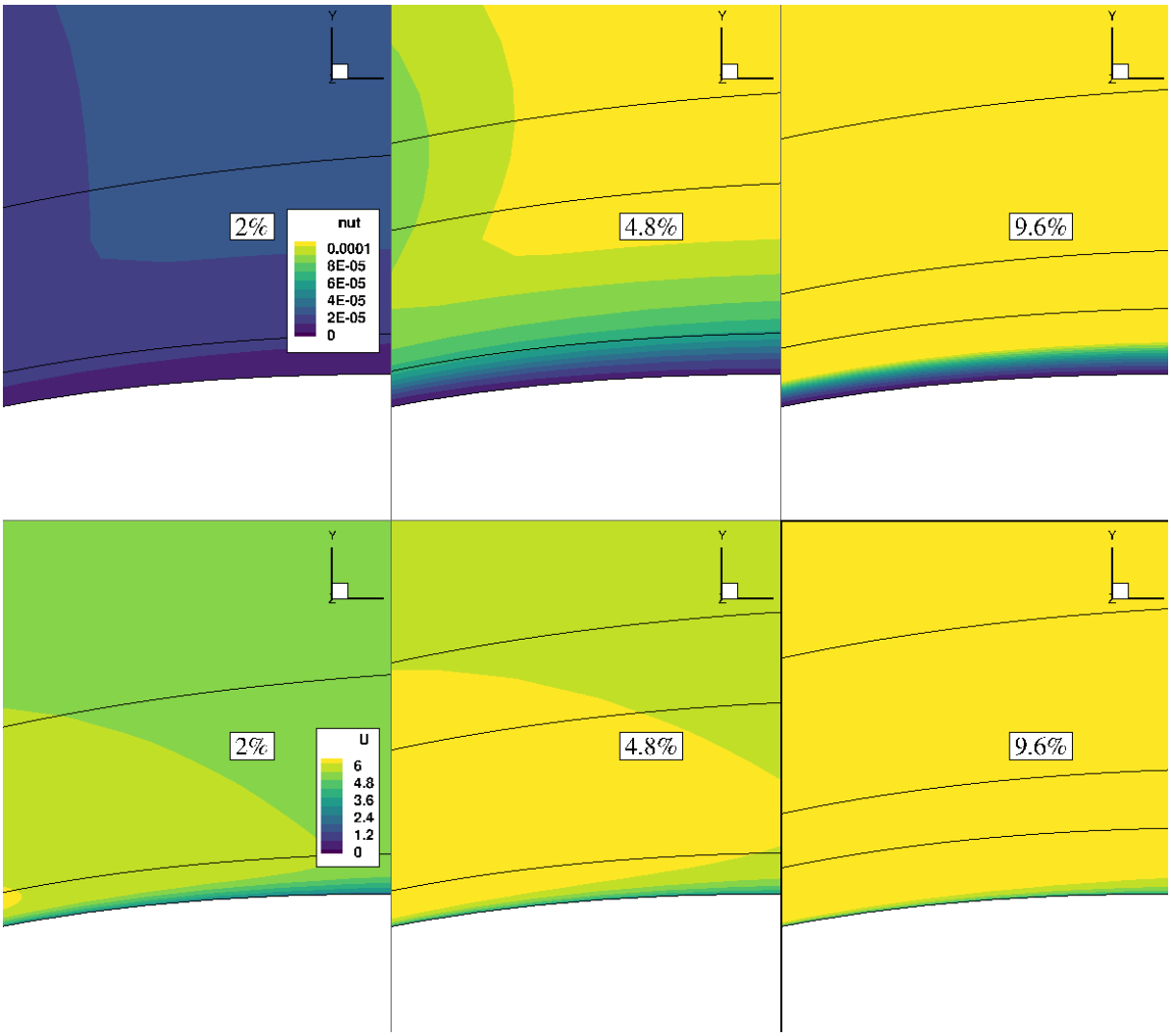
Response to Referee #1

1. **Inflow specification and interpretation**

The boundary conditions in terms of turbulent quantities and more details on inflow turbulence behavior are supplemented in Appendix B. The trend between inflow turbulence intensity and the flow separation is detailed in Fig. 12 and a zoomed-in view below.



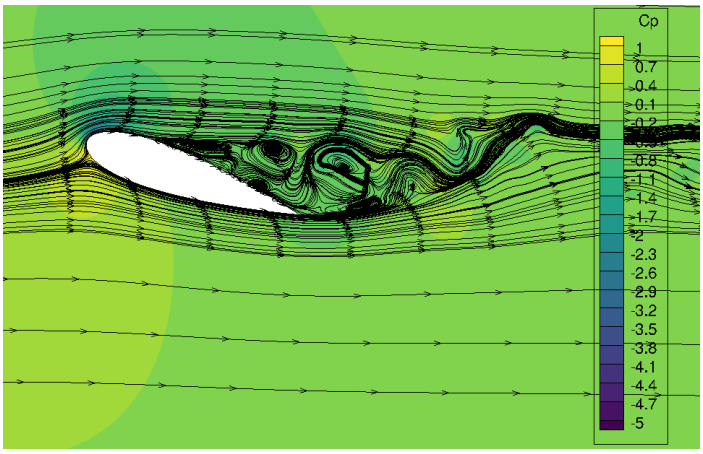

2. **Interpretation of the URANS-DDES**

As you suggested, the description of Fig. 9 (d) is rephrased to avoid confusion and restrict the analysis to the modelled k, the flow angle as supplemented as Fig. 9 (c).

3. **Numerical sensitivity**

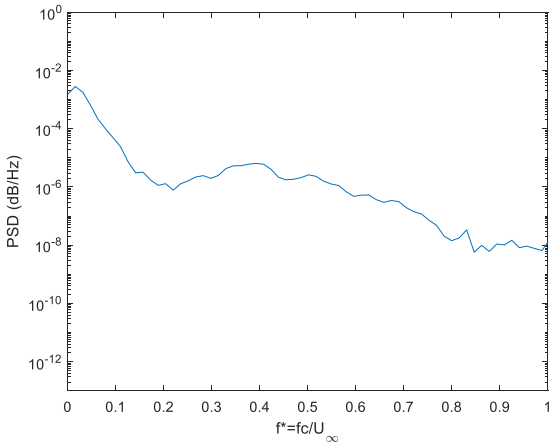
The spanwise refinement was decided after the mesh study. The refinement in spanwise direction in x2 and x5 had negligible influence for a few configurations studied internally. The focus is not on the quantitative difference between AR=0.25 and AR=2.5, rather if one can possibly predict the abrupt stall onset of not.

Here is an example of Cp and streamline from the fine meshing.

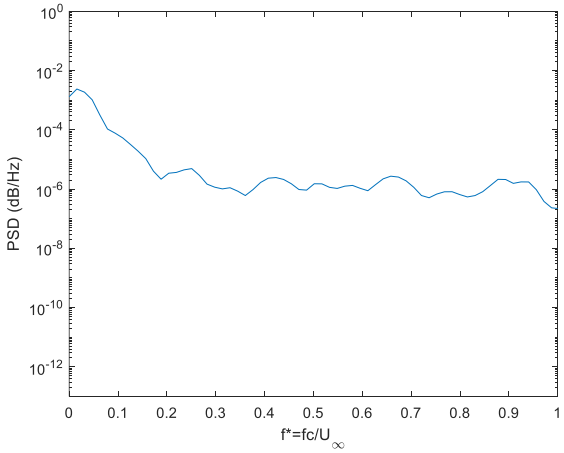



Looking at the streamline, the vortex structures are different to that we see from Fig.9 (b), which already explains in Appendix A why the temporal fluctuation is different between reference and fine mesh. Yet, the impact on the averaged integral force on the airfoil surface (Cl and Cd) is minor.

Appendix A is revised with more details. Additional spectral analysis can be found below from the reference and fine case. This is for TI=2% at AoA=19°, close to the deep-stall, so the periodic vortices are not strongly depicted. The high response in the low frequency region resembles from two cases, however the fine mesh shows more equal distribution in the rest of the region.




FFT of Cl (reference mesh setup)



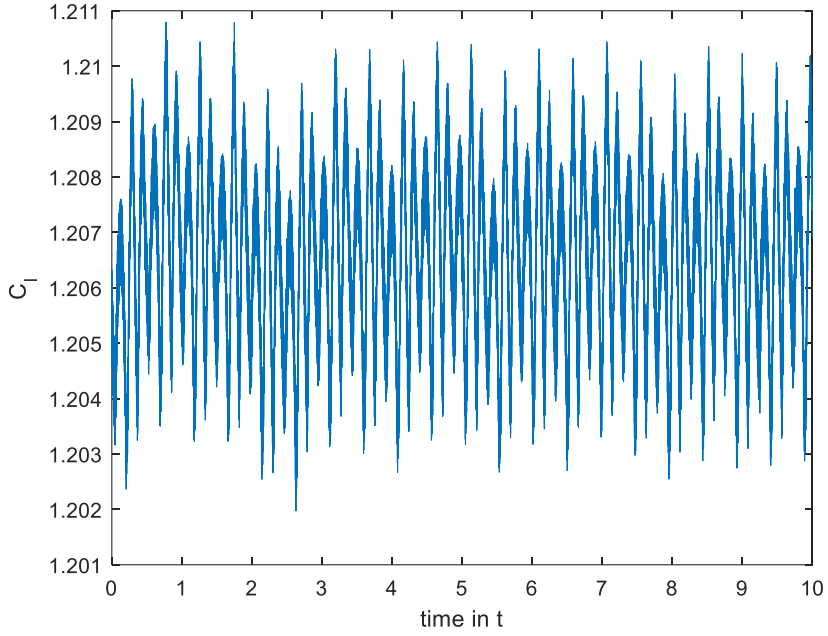

FFT of Cl (fine mesh setup)

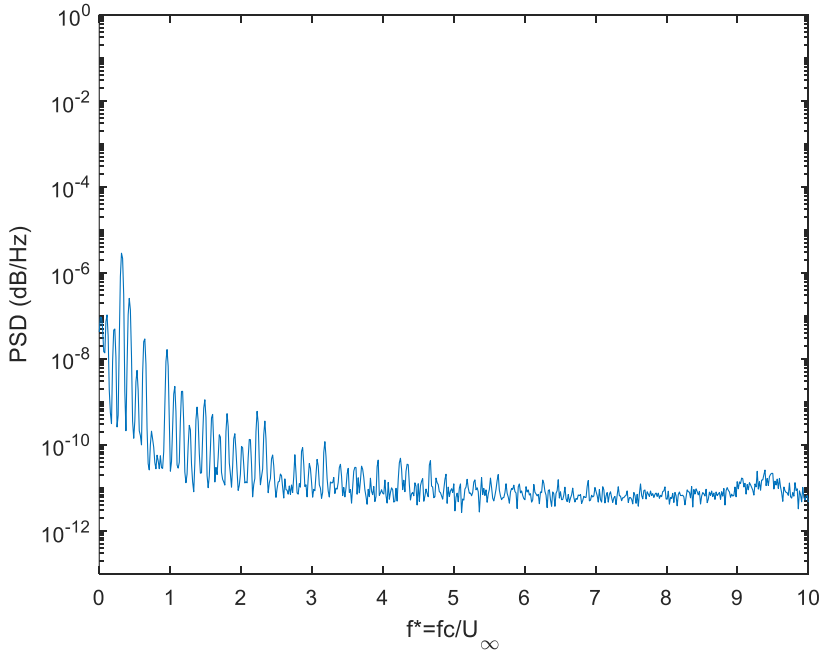
CPUh is in the order of 1e+4 CPUh for both URANS and DDES. As diverse nodes in the cluster system were used, a precise comparison down to lower order of magnitude is difficult without running additional simulations. Therefore, the difference is only mentioned as *negligible*.

## 4. Stall onset and sampling uncertainty

The onset criterion and spacing is added at the beginning of Sec. 4. The static cases are differently initialized, sometimes by potentialFOAM, sometimes by other existing solutions at different angle of attack. It is important that the simulations are fully converged before the analysis, which is addressed in the draft.

The averaging interval of 10 is sufficiently large, not requiring additional sensitivity study on averaging interval (see figures below). As the time-step is small, the maximum frequency resolved is f*~500, only 0.2% of that is shown in the manuscript. Another FFT with maximum range of f*=0 … 10 can be seen below.



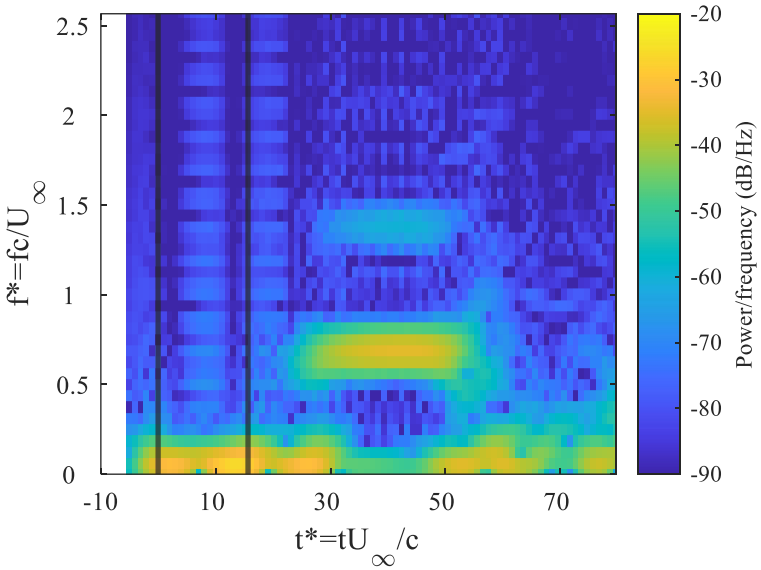
The spanwise variation is much larger than the temporal variation of the integral force on the entire airfoil. For example, the figure shown above (TI=4.8%, AoA=19°), the maximum fluctuation of Cl in time is 0.0088, but the spanwise variation is 0.46. Therefore, the spanwise variation is depicted as some sort of scale of uncertainty in the figures, rather the fluctuation in time.

## 5. Experimental comparison

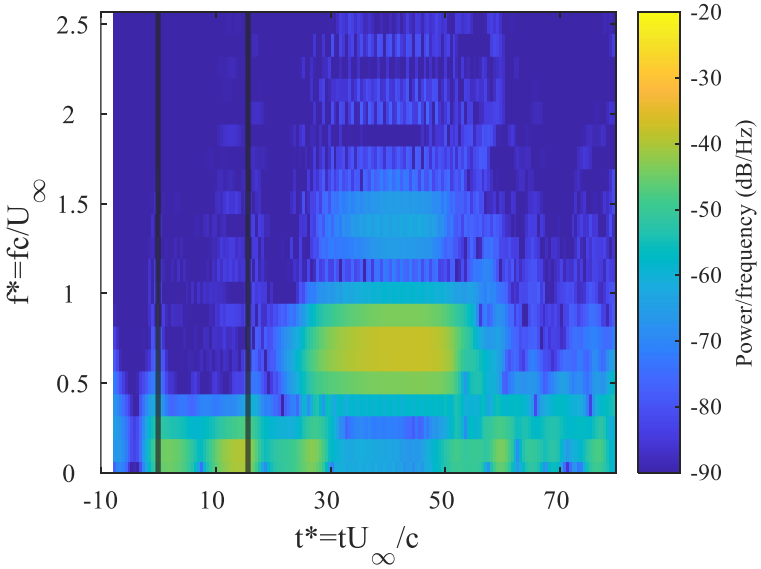
I have to emphasize that the agreement between the stall onset from the simulation (TI=3.6%) and measurement (0.3 … 1.1 %) is not addressed as the explicit validation. The possible reasons of discrepancy between the simulation and experiment are addressed multiple times through out the manuscript. Accordance with your comment, it is addressed in this section as well.
For the pitching cases, further information is supplemented in Section 2.2 and Sec. 5.1 in the revised version.

## 6. Spectral analysis

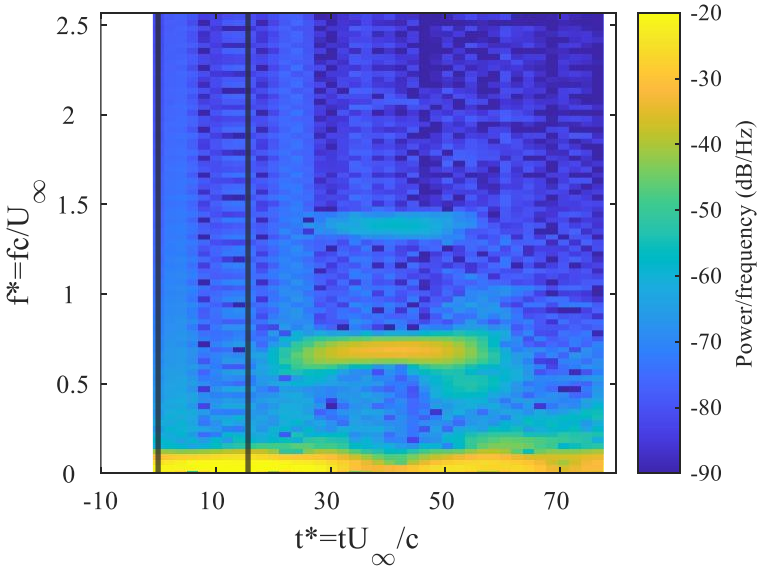
More descriptions are added. As an example, the sensitivity on the window size is shown below. No qualitative change is observed, the dominant peak remains at the same frequency range.




Reference spectrogram setup (Fig. 14 (e))




Half the window size




Double the window size

The disappearance of the peak is now interpretated as *full detachment from the airfoil*. The unit and the nondimensional frequency should be now more consistent.

**Minor comments**

- Fully turbulent conclusion is restricted.
- URANS in dynamic case is with transition model. In XFOIL, the transition was forced at the LE for the fully turbulent calculations (see Sec. 2.3).
- Reference length for St is added in the manuscript. Referring as AR=0.25 as 2D, is corrected.
- All corrected. The script can be provided upon request.

Thank you again for reviewing the paper.