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Unsteady separated and reattaching turbulent flow over a two-dimensional square-edged rib

by Y. Z. Liu, F. Ke and H. J. Sung

The authors conducted simultaneous measurements of streamwise velocity and wall pressure, using a hot wire and microphones, respectively. They performed wavelet analysis and multi-resolution analysis. The manuscript reports some useful information to the turbulence community. In particular, the paper adds a new piece of information regarding the flapping of the separated flow. **I believe that this paper merits publication in the journal.** However, the paper lacks of coherence and the manuscript is poorly structured and rather badly written, and some part of the manuscript would benefit from rewriting. The following issues must be addressed before the work is accepted for publication.

1) Introduction does not read very well, lacking of aims and objectives of the paper, and some of sentences do not make much sense. For instance, on Page 6, in the middle of the first paragraph, 'However, should be replaced with 'Furthermore'. On Page 7, the last sentence of the first paragraph beginning with 'No previous studies' contradicts the rest of the paragraph. Literature survey could have been improved. Simply listing some of the previous work is not necessarily a good literature survey. Each work needs to be critically reviewed in relation to the authors' present research.

2) The authors did not seem to explain why they chose $B/H=1.0$ case, and how the results could be useful in general cases of turbulent flow around a rib.

3) Although the last author (H. J. Sung) of the paper has a vast amount of knowledge and experience in wind tunnel experiments, the facility used in this study appears to be newly built or never used before. If this is the case, the accuracy of the measurements has to be assessed prior to any publication of the results.

4) On Pages 11-12, the rms magnitudes (18%, 16% & 14%) of the streamwise velocity fluctuations were mentioned without any comparison with existing experimental or numerical data.

5) On Page 14, regarding Fig 8, there is not much evidence supporting the flapping mode except for $x/H=-0.2$ and 0.75 . Certainly, no spectral peaks for the flapping mode can be observed in $x/H=9.75$. The spectrum seems to have been over-analyzed to some extent.

6) The overall explanation regarding MODWT part is rather vague. On Page 17, near the bottom of the page, it is not very clear whether the instantaneous pressure at $x/H=9.75$ is used for the conditional signal, or its band-passed signal is used instead. The whole section needs to be rewritten. Some of the sentences are unnecessarily long and vague.

7) On Page 18, using the pressure-velocity correlation, it is not clear what the authors wanted to see. The explanations regarding Figure 11 do not make much sense. For example, from the figure, the high-correlation regions (white or black) only move in the downstream direction. They don't have any vertical movement.

8) Overall, throughout the Results and Discussion part, the manuscript lacks any comparison with existing experimental or numerical data. The analysis was a little superficial and throughout the paper I found a lack of useful physical insight. The analysis fell short of presenting a theory or model that explains the observations.

9) Finally, the manuscript could be improved by proofreading.