

Title: About the suitability of different numerical methods to reproduce model wind turbine measurements in a wind tunnel with high blockage ratio by A. C. Klein et al.

---

In the manuscript, the authors performed numerical and experimental studies of a model wind turbine in the wind tunnel exposed to high blockage ratio. Two different numerical frameworks are considered, and the obtained results are compared with the experimental data. Unfortunately, the paper suffers from major issues that require a major revision before the paper can be considered for the publication. The major comments are:

1. The introduction is incomplete. The authors only provided a review of the previous studies done by themselves and their colleagues, and they neglected the key papers and contributions done by the other researchers who worked extensively on this topic (e.g., Research group at JHU, EPFL, KU-Leuven, ...).

2. The objective of the work is performing numerical simulations to validate the experimental data. However, the results presented in the paper cannot be considered as a validation. There is a huge discrepancy between the experimental data and numerical results and the authors did not explain the reasons behind that. The authors should perform systematic experimental and numerical experiments with providing a clear explanation of the observed discrepancies. Similar studies have been extensively performed by the other groups which some of them mentioned above. For example, the results presented in Figure 21 cannot be considered as validation. There is a huge difference between the experimental data and simulation results. Besides, the authors mentioned: "The curve for the baseline blade is missing in the current plot as the sensors had a malfunction during the measurement." This statement is not acceptable for a paper that is going to be published in a journal. The same trend is also presented in the other figures. No clear explanations are provided about the differences.

3. The authors mentioned: "As it is currently not possible to include the wind tunnel walls into the LLFVW simulations of QBlade, far-field simulations were conducted." Since the objective of the paper is exploring the blockage effect, it is not clear what the purpose of having the results from the QBlade is. It would be more relevant if the QBlade results considering the wind tunnel wall are added to the paper. Otherwise, it is not needed to add the results from another code that is not consistent with the experimental investigation.

4. As it is mentioned before, the validation section is not acceptable. Also, since Figures 9 and 10 are qualitative results, the authors need to provide more quantitative comparisons by, for instance, comparing the results at different locations. Although, even from the contour plots, the agreement is not good. Also, besides the mean velocity, the variances obtained from both the experiment and numerics should be provided. This is a very standard way for validation of numerical tools against the experimental data.

5. Figure 13-16, it seems that the y-axis chosen here is too wide to minimize the difference between the experiments and numerics. For example, in Fig. 13 (left), it is trivial that the on-blade velocity cannot be ranged from 0 to 30. In particular, considering the tip-speed ratio and the incoming wind speed, it should be in a much narrower range.

6. Most of the citation about the numerical frameworks are technical report, conference proceeding or personal communications. Typically, it is expected that the papers cited in the manuscript were peer-reviewed before.

7. The incoming flow is not characterized in the manuscript. The information about the incoming wind, the associated turbulence level, the Reynolds number based on the chord length is missing in the manuscript.

8. The results are provided without any sensitivity analysis to the grid resolutions. As mentioned before, the agreement between the numerical results and experiment is poor. Although the code might have tested before for other cases, it is required to perform the grid resolution sensitivity for this particular analysis presented in the manuscript. The convergence of the statistics also should be provided.