Answers to referee 2.

We are glad to have your support and time in reading our manuscript and writing your comments. Your remarks have been of great value to the betterment of the manuscript. We hope to fulfill the requirements.

1. The abstract is too long and general, failing in highlighting the value of the authors' work.

Ans: This will be corrected and more emphasis on the advantages of this model will be shown.

Steps taken: lines 15 and 50 highlight the importance of this work.

2. The introduction fails in highlighting the novelty of the authors' work. It is unclear why the proposed method should be preferred to other approaches available in the literature. On top of that, the latter are presented in a confusing way. More references should be added.

Ans: The advantage is that this is a model with higher fidelity than those of simple potential flows like Rankine bodies, although it takes more time, it is still much less than full rotor RANS simulations where the mesh around the blades has to be resolved. Its implicitness is also an advantage.

3. From the Reviewer point of view, it would be more effective to merge sections 2 and 3 into section 4, in order to have a more compact overview of the proposed AC model.

Ans: Indeed, all AC topics are moved into one section: stand-alone AC, linear correction, stand-alone AC validation, RANS-AC implementation and RANS-AC verification against stand-alone AC.

4. In section 4, where the AC-RANS model is presented, many information is missing. In particular, the algorithms used for the sampling of the inflow velocity from the CFD field and for the insertion of the volume forces into the grid should be clarified.

Ans: an algorithm presenting the implementation details is added.

Actions taken: the algorithm is in line 170.

5. No information about the model numerical set-up (mesh, numerical methods, number of iterations, convergence criterion) are provided. Has a mesh sensitivity been performed?

Ans: mesh, turbulence model, boundary conditions, number of iterations and convergence of the solution and the Cp of the turbine is added too. Two meshes are studied based on a square enclosing the turbine and the thickness of the AC. The coarse mesh yields good results and therefore it will be used throughout the work.

Actions taken: the details are shown in Section 2.5

6. No information about the AC model formulation is available. How was the polar data used for the simulations obtained? Are any aerodynamic models such as dynamic stall or flow curvature included?

Ans: The details are shown in Section 2. It is explained why these additional models are not included. Dynamic stall tends to conflict with the AC and flow curvature is computationally expensive because a new virtual profile has to be computed as well as its lift and drag coefficients at new angles of attack, this would imply calling a vortex panel method each azimuthal position times the number of iterations.

Actions taken: the polars are in Section 2.3. Line 150 explains the lack of D.S. and flow curvature.

7. In the Reviewer's view, it would be nice to split the results in two different section, one for the single-turbine cases and one for the multi-turbine ones

Ans: This is done by using Sections 2 and 3.

8. Line 52: How come the ALM cannot be used for multi-turbine simulations?

Ans: We didn't mean to say that ALM cannot be used for multi-turbine simulations, the model of Bachant is not scalable to multiple-turbines.

9. Line 61: Is there a quantitative definition for low-solidity?

Ans: Yes, it is included in Section 2.1, above line 105.

10. Figures 3 and 4 should be splitted in 3 sub-figures to improve readibility

Ans: These figures will be excluded. Multi-column or multi-row figures will include a), b), c) and so on.

11. Section 5.3: Was flow curvature considered somehow? In the Reviewer experience, neglecting such effect for relevant chord-to-radius ratios such as the one considered (c/R=0.2) might introduce a notable error in the results, especially if the static stall angle values were used for tuning as in this case.

Ans: Go to number 6. The AC overpredicts the power coefficient compared to experimental data of the Windspire turbine but follows a good trend. However it seems to overpredict the angles of attack according to the polars. This will cause issues in later sections and a thorough explanation is given.

12. Figure 13: it would be nice to add an arrow with the wind direction

Ans: The figure was redrawn and it is now Figs. 6 and 7.

13. Figure 14: the legend is not easy to locate, it is suggested to add a frame to it

Ans: This figure was redesigned and frames will be added to legends when possible.

14. Line 272: typo, "dessert" is written instead of "desert"

Ans: Thank you for the correction.