Interactive comment on "Study on Multi-Objective Optimization Design and Passive Control of Wind Turbine Airfoil" *by* Yong Peng et al.

Anonymous Referee #1

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Hello Peng et al.

Thank-you for the manuscript. The use of CFD for airfoil design optimization is interesting. Furthermore, taking a multi-objective optimization approach for accounting to all the different demands in wind energy is also an interesting approach. However, the work in it's current form does not really seem to incorporate a lot of factors that are typically considered in wind energy. Furthermore, the work lacked a lot of details that are important for publication, that lead me to think this work is incomplete. So I cannot accept this work in it's current form.

One of the important considerations in airfoil design in wind energy is insensitivity to leading edge roughness. The authors have not included any constraints or penalties in the objective function, nor have they discussed this issue.

Another factor is the treatment of blunt trailing edges. Sharp trailing edges were used in the optimization and the blunt trailing edge is added later. I can only assume that this is due to the unsteady nature of separated flow and the complications that arise in optimization. The authors demonstrated the technique on a NACA 4418 airfoil. An airfoil at this thickness is typically placed towards the tip where sharp trailing edges are desired. So it is not clear how this work is specialized for wind energy.

The title and the introduction states that this work is specifically for "passive control". Yet, the authors do not mention anything more on this. It is not clear what they mean by "passive control". Thus, it seems that the work is incomplete compared to the ambitions laid out in the title and introduction.

Overall, the paper gives inadequate details on the methods used. They focused more on the mathematics of defining the shape, but gave few details on the optimization and CFD methods. For example, it is not clear what turbulence model is used, they only state that they use a "genetic algorithm". I would expect more details on these methods.

The paper showed many CFD results, so in that area it is sufficient. However, they didn't really give enough information on the convergence of the optimization. I would have expected the authors to report the number of function evaluations and show the convergence of the optimization. To properly characterize a stochastic method like genetic algorithms, you would to repeat the optimizations multiple times with random seeds. So again, the work presented here is incomplete.

The writing and presentation is understandable and for the most part easy to read. There are a few sentences that did not make sense though. Attached is a copy of the paper with some additional comments specifically on the writing.

The graphics showing the airfoil shape were not drawn to scale, leaving an image that is highly distorted. Maybe this was done to accentuate variations in the y direction? However, this makes it difficult to judge by eye how the geometry is changing in reality.

There could be better ways to present this information.

Please also note the supplement to this comment:
https://www.wind-energ-sci-discuss.net/wes-2019-47/wes-2019-47-RC1-supplement.pdf