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Interactive comment on "A Method for Preliminary Rotor Design – Part 1: Radially Independent Actuator Disk model" *by* Kenneth Loenbaek et al.

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Dear Referee,

Thank you for your kind comments and for reading it carefully.

Some developments are not so clear such as the CP,opt where the bounding region is found from experience (p11).
We agree that it is not described in any detail how these limits are found. The range is mainly determined from a trial and error basis with some engineering judgment. We have changed from the previous vague sentence "Where the bounding region is found from experience." To the more descriptive: "Where the bounding region is found by observing that λ_{opt} has an approximate proportional behavior of $\sqrt{\frac{C_l}{C_d}}$ and the limits

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are simply determined to contain the optimal solution."

On page 13, I understand the reason to exclude drag but this is perhaps one of the more important factors in the design of the rotor and consideration should be given to including it in the model.
The considerations about including drag for the induced velocity is described in section 2.6 (Blade loading without drag in induction). It is thought to be too involved to present both cases and that it would lead to unnecessary confusion as the equation becomes much more convoluted. We have investigated the difference between including drag for the induced velocity or not in terms of $C_{P,opt}$ and the difference between including drag and not is within 99% for C_l/C_d>25. Showing this result is thought to be out of scope for this paper.

For the validation with BEM, what is the Reynolds number used for the airfoil data?
The Reynolds number does indeed play an important role in the aerodynamic performance in terms of Cl and Cd. CCBlade has the capability to use polars with different Reynolds numbers as the flow conditions change. Throughout this manuscript, it is assumed that the aerodynamic polars are fixed and hence they are the same for both RIAD and CCBlade. The value of the Reynolds number has been added for the input description.

Could this there be some experimental data with which to compare?
Comparing with experimental data or even just higher fidelity simulation methods (CFD) is of great importance for wind turbine design. With that said, it is thought to be out of scope within this paper to validate the BEM equations, hence why the focus has been to show that RIAD is equivalent to the classical BEM equations. A feature of RIAD is its ability to change the closure equations, and an expected part of our future work is to use higher fidelity method to test or make a corrected set of closures.

... discuss in some additional detail why this approach is better that CCHelper or other design methods. What is the advantage?

In section 3.4 (Compared to other work) we do mention how our work relates to work and methods by others. The main difference between RIAD and others is the parameterization of the BEM equations. RIAD is thought to be a better parameterization for optimization. We are not familiar with CCHelper and trying to search for it did not reveal any information, so it is hard to compare its difference and similarities.

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