

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

**Kenneth Loenbaek et al.**

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Dear Peter Jamieson,

Thank you for your very kind comments and for reading the manuscript carefully.

*Last sentence of Section 1 Introduction reads a bit strangely with word "where". I understand that this paper is Part 1 (describing the method illustrated with power maximization) and Part 2 will deal with use for load constraint. Is that correct?*

We understand that the sentence is confusing, and it has been updated as: This is Part 1 of a two-part paper. Part 1 describes an aerodynamic model for a wind turbine rotor and the use of the model for power optimization. Part 2 is described in Loenbaek

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et al., 2020. where the model is applied for load constrained power optimization.

*On Figure 4 maybe wake rotation loss at top of figure a) should be deleted or amended. The title "Significance of wake-rotation loss is fine" but what you are showing as correctly stated in the expanded title below the figures in a) is the wake rotation factor with 1 corresponding to no loss and zero to maximum loss.*

We agree that the title of the figure is misleading, and the title has been changed from "Wake rotation loss" to "Wake rotation factor", which is thought to resolve the confusion.

*... the equation provided there for  $C_p$  max ... will enable quite accurate estimation of  $C_p$  max without solving BEM equations which is about as easy as you can get!*

The authors agree that the methods described in your work and the equation by Wilson are very simple and even though they are both approximate solutions they are fairly accurate. This is also the reason that we write "... the generality at which this method can be applied." as it is thought that the method described in our paper is more generally applicable, regardless of the choice of BEM equations.

*Just to be clear are you still referring specifically to the optimization method to determine  $C_p$  max or more generally? ...*

The authors do not clearly understand the difference between "CP max" and "more generally" in this context. We do see that the description is vague and not very specific. It is also recognized that the method presented in your work is not using an approximate equation as implied by the comment. We have therefore added a comment saying: "... or an assumption of constant axial induction." Which is thought to be an assumption of your work?! The others do apply some of these assumptions.

*"Common to them all is the exclusion of drag....". This is simply wrong for Jamieson2018 if not for any of the others referenced.*

Your work does indeed include drag for the induced velocity after carefully reading your work. The misunderstanding is that you do present an equation (eq. 1.79 p. 48) where drag is excluded from the induced velocity. Afterward, you then continue with

the more general equation where drag is included. We are sorry about the confusion and have updated the statement so that it is now only the 3 other references where drag is excluded from the induced velocity.

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