

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

Anonymous Referee #3

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This paper is the first of a two-part series on Rotor Design. This paper deals with a radial independent actuator disk model (RAID). The actuator disk model is one of the most basic models used for describing either a wind turbine or propeller. The unique approach outlined in the paper is to look at a Local-Thrust-Coefficient and a Local-Power-Coefficient to quantify wake-rotation-loss, tip-loss and viscous loss. Using this approach will, according to the authors, lead to rotor optimization, the subject of Part 2. The paper introduction does a good job introducing the “why” of RAID. The derivation of CPT and CT is straightforward as is the description of CLP and CLT. The graphics, such as Fig 3, also make the paper easier to follow. Some developments are not so clear such as the CP_{opt} where the bounding region is found from experience (p11). This should be described in more detail. Describing the optimization of variables such

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as tip-speed ratio, does make sense and is well presented. 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. I understand that the goal is to keep it simple but the model would be more useful if it were included. For the validation with BEM, what is the Reynolds number used for the airfoil data? This is very important as far as airfoil performance. That would give some insight into the values used for cl/cd , α , and cl shown on p15. Figure 9 does show good agreement so what you assumed must be correct, if one believes the CCGBlade values. Could this there be some experimental data with which to compare? In the end, this is a nice approach to rotor design however, I would have hoped that the paper could discuss in some additional detail why this approach is better than CCHelper or other design methods. What is the advantage?

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