Dear David Wood, referee #1

Thank you for your review of the paper and comments.

We fully agree that the AD models are extremely important for understanding the flow physics of wind turbine rotors.

Below are the author rebuttals in red and referee #1 comments in blue.

Actuator disc (AD) models of wind turbine rotors are extremely important as they provide basic information about the wind flow through the rotor and optimal turbine performance. Nevertheless, AD analysis can use widely varying methodologies. For example, Wood & Hammam (2021, extra reference below), cited as WH, used conservation of axial and angular momentum and the calculus of variations to derive the optimal performance of horizontal-axis wind turbines over a wide range of tip speed ratio. In contrast to the present analysis, WH make no a priori assumptions about the disc loading and find that the constant loading and axial induced velocity assumed here, are approached only at high tip speed ratio for optimal rotors. This limitation of the present analysis should be noted in the text.

It's correct that the analytical solution for the 2-D AD is only presented for a constant loading although it might be possible to integrate other load distributions. However, in the final numerical implementation we will use superposition of several constant loading discs to simulate an arbitrary loading.

We propose to include a citation of your work in the following way on page 4 of the manuscript

Another study by van Kuik and Lignarolo (2016) shows the non-uniformity of the axial velocity profile caused by the pressure acting at the stream tube annuli and thus making them not independent from each other in contradiction to the independence found by Gaunaa et al. (2023). Finally in this group of models can be mentioned the work by Wood & Hamman (2021) who used conservation of axial and angular momentum and the calculus of variations to derive the optimal performance of horizontal-axis wind turbines over a wide range of tip speed ratio. In the 2-D model to be presented here the analytical solution is limited to a constant loading.

On the other hand, WM's analysis is not easily extended to yawed and coned rotors whose performance dominates the present analysis and conclusions and provides the major novelty in the manuscript. Valuable information is provided for these conditions as well as ideas for extending the analysis.

As minor comments:

1. Equations (13, 14) are not the divergence of (11,12): they are the components of the divergence.

Now we take the divergence of Eq. 11, 12:

Changed to:

Now we derive the components of divergence of Eq. 11, 12:

2. The power, thrust and torque coefficients are commonly written is subscripted form. Equation (48) would be more readable if it contained C_Q and not CQ.

We change to subscripts for the thrust and torque coefficients:

C_T

C_Q

Extra Reference will be included

Wood, D. H., & Hammam, M. M. (2022). Optimal performance of actuator disc models for horizontal-axis turbines. Frontiers in Energy Research, 10, 971177.