Wind Energ. Sci. Discuss., referee comment RC2
https://doi.org/10.5194/wes-2021-18-RC2, 2021

Comment on wes-2021-18

Anonymous Referee #2

Referee comment on "Maximal power per device area of a ducted turbine" by Nojan Bagheri-Sadeghi et al., Wind Energ. Sci. Discuss., https://doi.org/10.5194/wes-2021-18-RC2, 2021

The work is an optimization of a shrouded wind turbine using axisymmetric CFD, where the rotor is modeled as an actuator disc. The parameters are the non-dimensionalized length and diameter of the diffusor (based on an Eppler E423 airfoil) and the inflow angle.

The k-omega, SST turbulence is used and is considered a good choice. However, the Re number based on the chord is only 300.000 which is quite low for this turbulence model and where transition is very important. Why this low Re number and could a transition model such as gamma-Retheta be applied ? It could be because it is intended for small rotor, and are there any experimental data available ?

A constant local thrust is specified in Eq. 1 and the rotor is modelled as a pressure jump. Would it be possible to also include a tangential load creating swirl that may also change the pressure ? Instead of using simply the pressure one could have used volume forces that would allow later to model a real blade geometry. Is a constant CT the optimum for a shrouded WT, where the inflow velocities are high near the shroud airfoil ? It seems that by putting the rotor further back as shown in Figure 7 the flow is quite constant.

The grid is very coarse, in the order 0.2-1 million cells, which may be justified by the relatively low Re number. The number of parameters run in the order 5 is quite coarse but the results shown looks physical.