Review of the manuscript:

M. P. van der Laan, S. J. Andersen and P-E. Réthoré:

"Brief communication: Wind speed independent actuator disk control for faster AEP calculations of wind farms using CFD"

General comments:

This brief communication describes the extension of a methodology for calculating the AEP of wind farms. The extension leads to an acceleration of the calculation compared to the baseline method. The description of the basic method along with the introduced simplifications and assumptions can only be comprehended if one is familiar with the corresponding detailed publications referenced by the authors. This is fine for a brief communication. But I suggest that the authors refer to corresponding published works every time when assumptions or simplifications are explicitly mentioned (see also below).

If I understood the manuscript correctly, the novelty of the method concern a scaling of the thrust coefficient C_T to mimic the influence of changes in wind speed instead of actually changing the wind speed in the CFD calculations. This leaves the global flow field unchanged and the modified thrust coefficient results in more local changes of the wind field in the area of the turbines and their wakes. By this and by a clever sequence of restarts based on converged previous calculations, the authors were able to reduce the computation time by a factor of 2-3.

Methods for fast, CFD-based AEP calculation of wind farms are important and work on acceleration of the calculation process are relevant. Therefore, I basically support the publication of this brief communication. However, the description of the method and the new aspects is very difficult for the reader to understand, especially if he does not know the publications of the baseline method. The authors should therefore revise the text taking into account the comments below, describe page 3 in some more detail and include citations at all points where assumptions and simplifications are mentioned.

Specific comments and remarks:

- Abstract: The last two sentences of the abstract contain important assumptions of the new aspects of the method and should be picked up at page 3 where the velocity scaling is introduced.
- Introduction: In atmospheric flow properties like integral length scale, turbulence intensity, shear profile etc. depend on wind speed. It is unclear whether these properties are also scaled in the proposed method or if the impact of wind speed is neglected. This should be mentioned and justified.
- 2.2, l.2-3 p.3: Unless the reader already knows the cited previous work, it is unclear that the average of the square velocity is used to obtain the scaled thrust coefficient c_T*. Please add shortly this information.
- 2.2: l. 4-5 p.3: “The thrust force distribution of the AD is based on a normalized thrust force distribution”. For the NREL 5 MW wind turbine, the thrust force distribution almost linearly scales with the rotor thrust coefficient c_T only below rated conditions and is flattened at higher wind speeds. Please add some information about how the thrust distribution is scaled with your method and how you deal with above rated situations.

- 2.2: l. 6 p.3: Please define what is meant with “standard C_T curve” and give some reference.
- 2.2, p.3: It is unclear to me how the scaling parameter s is used within the simulation. Please clarify and give some justification.
- Conclusions: l.11-12 p.6: The application of this method to complex terrain situations should first be proven. In complex terrains, flow inclination, changes of the wind direction over the rotor disc, flow separation and large scale turbulent structures are apparent. These effects do not necessarily linearly scale with the inflow velocity. I am looking forward to your results.