

Wind Energ. Sci. Discuss., referee comment RC1
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Comment on wes-2021-80

Anonymous Referee #1

Referee comment on "Evaluation of different power tracking operating strategies considering turbine loading and power dynamics" by Florian Pöschke and Horst Schulte, Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2021-80-RC1>, 2021

The paper presents two derating/active power control strategies and their performance in terms of loads and power tracking. Moreover, the authors modelled the turbine power response by using transfer functions which can be easily used for wind farm control design. The topic is very interesting and highly relevant for the readers who are interested in wind turbine and farm control. However, I found the structure of the paper is not well-organised and the contribution of the paper is not clearly highlighted. As mentioned by the authors, similar derating strategies were also proposed by (Aho et al. 2016) with studies of the loads. Can the authors highlight the key novelty of this paper?

In addition, the authors only presented two equations to describe their control design. It is unclear to me if these two strategies will work during the transition between normal controller and derating. In addition, from my understanding, the chosen simulation cases were assumed that the wind speed was always sufficient to generate the demanded power. In reality, the wind speed sometimes might not be high enough for producing the required power, then how would the controller behave? Does it need to switch back to the normal controller and how would it affect the loads?

Please find my further comments as follows.

- Title. Do not use unnecessary acronyms in the title. Not everyone knows what APC means.
- Introduction. I found there is a lot of relevant studies missing, including some of the earliest works on this topic. For example, [1], [2], [3], [4], [5] and [6].
- Introduction. '... the paper aims to feed the discussion on the integration of dynamical turbine models for control design and simulation study of large-scale power systems. I don't think this is the only contribution by the paper. Please clarify the novelty and contribution of this paper.
- Section 2. Equation (2). Do the authors assume derating always happens in the above-

rated wind region? The paper claimed that the generator torque is a function of the wind speed, which is not typical for a normal controller. Did the authors use some sort of a wind speed-based look-up table to implement these derating strategies?

- Page 3, Line 75. Typo. (Fig. 1 and (2)) → (Fig. 1 and 2)
- Section 3. The authors claimed that the linear model dynamics were obtained somehow. I didn't understand how the linear model was obtained. Is it via the linearization tool in FAST? Most importantly, I found Section 3 is redundant. Why would the readers need to know this 'control design' section? The derating strategies have already been presented in Section 2.
- Section 3. "... the observer estimates the current effective wind speed by a measurement of the rotational speed". Typically, the wind speed estimator also requires the knowledge of pitch angle and generator torque. Is there something missing or the authors are referring to some better designs?
- Section 4. The authors presented a blending of OS1 and OS2. I am wondering if there are any low-pass filters used for the torque signal and rotor speed set-point signal?
- Section 4.1 and Section 4 are similar. For example, both sections refer to the same figure. Perhaps it would be easier to read if both sections are combined. Also, the titles of Section 4.1 and 4.1.1 are similar.
- Figure 2. Caption. What are (a), (b) and (c)? They are not shown in the figure. In addition, the authors tend to put all plots into one figure, and in the text, different sections refer to the same figure. It is hard to read. For example, Figure 2 (a), (b), (c) are referred in Section 4.1 but Figure 2 (d) is mentioned in Section 4.1.1. I suggest the authors separate out Figure 2 (d) from Figure 2 as they are in a different time scale. Moreover, Figure 2(d) is more relevant to Fig 3 (a).
- Figure 3. Figure 3 (b) and (c) are not really linked Figure 3 (a). The authors should separate them.
- Section 4.1.1. '...fewer blade-tower interactions due to the reduced rotational speed,...'. Why was that? Isn't it that the opposite is true, that the reduced rotor speed makes the 3p frequency closer to the tower mode, thus, it will increase the coupling between 3p mode and tower mode?
- Section 4.2. Interesting power tracking studies. Did the authors consider the switching between the normal controller and OS1 or OS2? What do OS1 and OS2 behave when the wind speed is not sufficient to generate the required power?
- Section 5. '... it is discussed how different operational strategies can be designed for wind turbines using a model-based control design'. Did the authors use model-based design for developing the derating strategies in Section 2? Or did I miss something?

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