

Wind Energ. Sci. Discuss., author comment AC1
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Reply on RC1

Amir R. Nejad et al.

Author comment on "Wind turbine drivetrains: state-of-the-art technologies and future development trends" by Amir R. Nejad et al., Wind Energ. Sci. Discuss.,
<https://doi.org/10.5194/wes-2021-63-AC1>, 2021

Authors would like to thank reviewers for their constructive comments. All comments have been addressed and the paper is revised accordingly.

Comment 1: This is a useful review paper covering the different elements of the wind turbine drive train, including condition monitoring. It is reasonably structured, although the modelling and analysis section (2.5) really only applies to the gearbox. As such it could be moved into section 2.2.

Response 1: Section 2.2 covers the design trends, not limited to modelling, while section 2.5 is dedicated to modelling only. We agree that 2.5 in its current form applies to the gearbox. We have updated and included modelling of generator in the revised version.

Comment 2: Some text corrections/clarifications are required: p5 line 9 - should "epicyclic systems" be stages ?

Response 2: this sentence has been revised as: With multistage gearboxes using four or more planetary gear systems...

Comment 3: 2.2 This section is missing important discussion of gearbox casing distortion under load, and the influence on gear and bearing loading

Response 3: This is now included in revised version.

Comment 4: p6 line 7 "It aims to achieve a trade-off between generator size and maintenance effort." - unclear

Response 4: This sentence has been updated.

Comment 5: p6 line 27 should this be simply generators ? not specifically PM machines

Response 5: Agreed and corrected.

Comment 6: p6 line 32 compensating gearbox reliability needs to be mentioned to provide the correct context

Response 6: Agreed and updated.

Comment 7: p7 line 11 speed should be shaft speed

Response 7: This has been changed.

Comment 8: p8 line 3 power should be converter with power

Response 8: This has been changed.

Comment 9: p8 line 16 the nature of the energy storage should be mentioned

Response 9: The energy storage is lithium-ion battery. It is now mentioned in the paper.

Comment 10: p8 line 20 the term "rotating" is unclear

Response 10: It is now corrected to 'the rotating speed control'

Comment 11: p9 line 2 the term "grid-supporting mode control" needs to be more fully described and converter topology referenced

Response 11: It is now corrected to 'grid-following mode control'

Comment 12: p9 line 7 an outline description referencing converter topology and control is required for grid-forming mode control

Response 12: More elaboration is now added

Comment 13: p9 line 14 "converter choice of cooling system" needs to be rephrased

Response 13: It is now changed to 'The type of cooling system chosen for the converter'

Comment 14: p12 lines 21 to 25 seems to be written assuming offshore wind - onshore and offshore O&M costs should be distinguished

Response 14: This has been clarified and additional references added.

Comment 15: p13 line 8 'sampled' is misleading - the sampling rate is generally much higher with averaged results saved every 10 minutes

Response 15: This has been rewritten to make it clearer.

Comment 16: Section 3.1.1 changes to power curves is a powerful method for identifying insipient faults - Gaussian Process models have recently been found to be very effective at this. This emerging approach should be discussed and referenced

Response 16: A discussion on the use of GP models has been added under 3.1.1 (iii) NBM.

Comment 17: p20 line 15 spar support structures are reasonably rigid, this conclusion will not apply to all floating wind - this should be made clear

Response 17: we have modified the sentence to make it clear that the case study turbine was on a spar support structure. Regarding the "spar support structures are reasonably rigid" we would like to highlight that the wave induced motion of the case study spar was the highest among the TLP, and two other semi-submersible turbines - please see: <https://doi.org/10.1016/j.marstruc.2015.03.006>

Comment 18: p20 line 25 "plant" should be wind farm

Response 18: Our language editor is insisting on the word "plant". They view the proper term as wind plant. A "farm" they view as colloquial term.

Comment 19: p20 line 27 the term wake steering needs to be explained and its pros and cons discussed

Response 19: This paragraph has been expanded to explain wake steering, wake mixing and induction control and to more clearly relate these to impact on the drivetrain.