

Interactive comment on “Wind tunnel study on power and loads optimization of two yaw-controlled model wind turbines” by Jan Bartl et al.

Anonymous Referee #2

Received and published: 20 April 2018

The paper presents a wind tunnel study on the performance (both power and load) of two model wind turbines for different yaw angle distributions. Three different case studies are investigated in details: (i) the effect of the upstream turbine yaw angle under full-wake conditions, (ii) the effect of the upstream turbine yaw angle under partial-wake conditions, and (iii) yaw moment mitigation by yawing the downwind turbine.

Overall, the paper is well structured with a comprehensive literature review. The results are new and are of interest for those who study wake mitigation strategies. I have enjoyed reading the paper, and I recommend it for publication with no hesitation. I have only one major comment and a few minor comments that can be found in the

C1

following:

- Figure 8(c): I found it very surprising that, for large lateral offset values such as 0.16 and 0.33 (normalized with the rotor diameter), the yaw moment of the downwind turbine is higher when the first turbine is yawed. On the contrary, I expect to see a lower moment in this case as the wake deflection essentially alleviates partial wake conditions.
- It would be useful to mention that the yaw moment can only be an indicator of unsteady loads due to inflow shear or yaw misalignment. The effect of large turbulent structures (especially those in atmospheric boundary-layer flows) on turbine loads cannot be shown by the sole consideration of yaw moment.
- I agree with the other reviewer that the discussion part is relatively redundant, and it does not add new contribution to the paper.
- Please compare your wind tunnel blockage ratio with commonly acceptable values in the literature.
- Page 6, Lines 28 and 29: Please compare your results with those reported in the literature (e.g., Ozbay et al. 2012 and Bastankhah and Porté-Agel 2017).
- Page 4, Line 17: Please add space between “. . . still detectable.” and “At”.
- Page 5, Line 15: It should be written as “. . . and 0.007 (0.9% of the absolute CT value), respectively”.
- Figure 3: I recommend using colors with more contrast.
- Page 9, Line 9: Can it be shown using velocity measurements?

Additional references:

Ozbay, A., Tian, W., Yang, Z. and Hu, H., 2012. Interference of wind turbines with different yaw angles of the upstream wind turbine. In 42nd AIAA Fluid Dynamics Conference

C2

and Exhibit (p. 2719).

Bastankhah, M. and Porté-Agel, F., 2017. Wind tunnel study of the wind turbine interaction with a boundary-layer flow: Upwind region, turbine performance, and wake region. *Physics of Fluids*, 29(6), p.065105.

Interactive comment on *Wind Energ. Sci. Discuss.*, <https://doi.org/10.5194/wes-2018-24>, 2018.