

## ***Interactive comment on “Free flow wind speed from a blade-mounted flow sensor” by Mads Mølgaard Pedersen et al.***

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Thank you very much for carefully reading the manuscript and for your comments, suggestions and editorial corrections.

1) In the aeroelastic simulations, the 3D correction method by Snel (1993) is applied, while the actuator line simulations have been run without 3D corrections. In both cases, however, uncertainty is expected due to discrepancies of the tabulated CL-CD coefficients and due to the 3D effects not taken into account. We will stress this in the paper and, furthermore, mention that the methods are not completely independent as they both rely on the tabulated CL-CD polars.

2) Your understanding is correct. We will explain that eq. 24 includes effects of both

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horizontal and vertical skew flow due to yaw misalignment and tilt/flow inclination respectively. We will make it clear that  $\chi$  and  $\Phi_r$  are the 3D angles, while  $\chi_{hor}$  and  $\chi_{ver}$  are the horizontal and vertical projection of  $\chi$ , respectively.

Response to comments in the supplement:

- To our knowledge it is not possible to mount a spinner anemometer at a position where it measures the free stream inflow velocity at all wind speeds. The reason is that the axial induction at the rotor centre is a non-linear function of the wind speed, and a wind-speed-dependent calibration is therefore required; see e.g. (Pedersen 2014).

- You are right that tangential flow is also influenced upstream, but it is mainly variations due to blade passing. The current tangential induction model, however, only describes the reaction to the torque force that makes the wake rotate. It is not exactly clear where this effect starts, but it is assumed to be insignificant a short distance upstream. We will make that clear in the manuscript.

- We will change the sign of the sensor velocity to:  $V_r = V_{rel} + V_s$

- We will delete Fig. 14.

- We will stress that whether the error due to coordinate transformation counteracts the error introduced by dynamic deflections is highly dependent on the turbine design as it depends on the actual flap and twist properties of the blade.

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Snel, H.; Houwink, R.; van Bussel, G.J.W.; Bruining, A., 'Sectional Prediction of 3D Effects for Stalled Flow on Rotating Blades and Comparison with Measurements', Proc.

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European Community Wind Energy Conference, Lübeck-Travemünde, Germany, 8-12 March, 1993, pp. 395-399, H.S. Stephens Associates

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Interactive comment on Wind Energ. Sci. Discuss., <https://doi.org/10.5194/wes-2017-57>, 2018.

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