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Interactive comment on "An innovative method to calibrate a spinner anemometer without use of yaw position sensor" *by* G. Demurtas and N. G. Cornelis Janssen

Anonymous Referee #3

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General comments

The paper presents an alternative method of calibrating spinner anemometers. A spinner anemometer is a custom implementation of sonic anemometry, with 3 1D sensors individually mounted on a wind turbine' spinner surface. Horizontal wind speed, yaw misalignment and flow inclination angle are obtained from raw signals (wind velocity at sensor) processed based on spinner and blade root geometry as well as sensor location on spinner.

As opposed to 2 other previously developed calibration procedures, the proposed method does not require the availability of turbine yaw position information. Since this scenario is encountered in many wind turbines, the proposed method is of practical in-

terest. The new method is based on observed dependency between yaw misalignment and the wind speed measurement from a spinner anemometer. Combining this observation with simulated data and field measurements acquired in constant wind speed conditions (over specific yawing span), the authors define a method of optimizing the correction factor necessary to adjust the "default" calibration value in order to obtain a "correct" calibration value.

While the implications of the new calibration method are evident and the authors present a good amount of data to support some of their observations and reasoning, the paper does not supply enough information to validate key assumptions and the quality of results. The overall formatting of the paper is not optimal with multiple notation inconsistencies and incomplete graphics obstructing comprehension.

Based on the above observations, I recommend this paper for publication after major revisions. Suggested corrections attached below.

Major corrections

- [section 5, 6, 8] The proposed calibration method is evaluated based on the resulted correction factor and related spinner anemometer data. While this offers a measure of reproducibility, it does not imply final result accuracy (especially in the absence of reference measurements validating the initial assumptions). Comparison of spinner anemometer data versus reference measurements should be included as a measure of effectiveness for the new calibration method.

- [section 3] Given the strict assumption of "constant wind speed", zero flow inclination and the lengthy measurement/yawing procedure, site reference measurements (wind speed, direction, turbulence obtained from another instrument, derived yaw misalignment and flow inclination angle) should be provided

- [section 5] Tests 1, 2, 4 and 6 were discarded from the final calibration factor variation. The reasoning (is it yawing span or different rotor positioning?) should be elaborated

given that the resulting $\pm$2.7% variation represents a major evaluation of the method and the related $\pm 90^\circ$ yawing span (tests 7-10) contradicts the final recommendation of $\pm 60^\circ$ [P11 L14].

- Given the current form of this paper, the referenced “Calibration of a spinner anemometer for flow angle measurements” is a must-read. A minimum necessary amount of background information (description of symbols, coordinate systems, etc.) should be included in the paper.

- All notations, plot labeling, plot legends and figure descriptions should be checked for consistency and completeness.

Minor corrections

- [P2 L14] The assumption that yaw misalignment equals inflow angle should be augmented by a short explanation on why this will not affect the efficiency of the calibration method and/or results accuracy.

- [P10 L2] The statement “a certain level of agreement between the three methods” could use further elaboration, especially given the evident agreement between GGref and TanTan.

- [figure 2D] Data for 75 to 90 deg angles missing

- [figure 2,3] Instances of correction factor related to wind speed calibration should be eliminated or explained accordingly.

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