Wind Energ. Sci. Discuss.,
doi:10.5194/wes-2016-29-SC1, 2016

WESD

Interactive comment

Interactive comment on "Nacelle power curve measurement with spinner anemometer and uncertainty evaluation" *by* G. Demurtas et al.

A. Borraccino

borr@dtu.dk

Received and published: 3 October 2016

Dear authors,

After reading the paper submitted for publication in WES, I would like to take the opportunity of the open discussion to highlight a few points that I believe require more consideration. It would also be interesting to have an interactive discussion with other members of the "wind research community".

The comments concern the uncertainty assessment of the spinner anemometer:

1) On coverage factors:

In general, it should be made clearer in the paper at which coverage factors are the uncertainty values given. I assume standard uncertainties were used (as defined by

GUM, i.e. coverage factor k = 1 for a Normal distribution of uncertainties). If so, then stating it once in the beginning of Sections 3 and 9 would be helpful. Whenever k is different from 1, then its value must be provided.

2) On uncertainty distributions

Asssuming a uniform distribution is only acceptable when there is 0 probability that the uncertainty falls outside some specific bounds. Even in such a case, it might be more likely that the uncertainty falls at one part (center?) of the distribution than another (e.g. triangle, truncated normal, etc). The default distribution in the GUM is the Normal one. Practically, it must be stated that a uniform (or rectangular) distribution is assumed every time the standard uncertainty is divided by sqrt(3) in order to account for the uniform distribution. For example, in eq. 20, I do not see why the sensor wind velocity could not fall outside of the [a- a+] range. The simple flow model has some level of inadequacy that may imply tails in the distribution, outside of this range. Statement lines 10-12 p. 19 may also be discussed.

3) On correlation between uncertainty components

In any uncertainty assessment procedure, the correlation between uncertainty distributions may have a large impact on the total combined uncertainty. The degree of correlation is often hard to quantify and thus needs to be "guessed". In the entire paper, correlation was disregarded and eq. 10 used.

Eq. 10 should formally be called the "law of propagation of uncertainties" (p15, lines 10-11 and p20 lines 12-13).

In particular in section 9.4: - uncertainties u1, u2, u3 are most likely fully correlated as originating from the same wind tunnel, same procedure, etc etc. Hence, u_ave would be = to u_1. - same for u_alpha. I would recomment considering u1,u2,u3 correlated with a correlation coefficient =1, and k_alpha uncorrelated with the sensor velocities. - u_U may thus be much larger (or lower)

Note: in Fig. 16, it is shown that u_U is relatively small compared to the prevailing components related to the mounting and the NTF. Hence, the question of correlation may not affect dramatically the final results.

Regards,

Antoine Borraccino

Interactive comment on Wind Energ. Sci. Discuss., doi:10.5194/wes-2016-29, 2016.