Atmos. Meas. Tech. Discuss., 6, C3895–C3897, 2014
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Atmospheric Measurement Techniques Discussions

Interactive comment on "Towards higher accuracy and better frequency response with standard multi-hole probes in turbulence measurement with Remotely Piloted Aircraft (RPA)" *by* N. Wildmann et al.

Anonymous Referee #2

Received and published: 6 January 2014

General Comments

The subject of this paper is mainly about laboratory tests of a miniature turbulence multi-hole probe used aboard small remotely controlled aircraft for atmospheric turbulence measurements (mostly small to medium scales due to flight duration restrictions). However, such a system should be further been tested and calibrated in field, because aerodynamic flight effects are quite significant in such systems. In addition, from the title of the paper I would expect a higher upper frequency limit of measurements than

the usual 10 Hz met in most aircraft turbulence probes.

Specific Comments

Page 9789, lines 18-20: This method of using only the five holes should be described in more details. In Fig. 5 the static (barometric) pressure is shown to be measured, but in which position on the aircraft. Static pressure defect may get quite significant depending on the measurement positions.

Page 9789, line 21: "Figure ?? shows ..." should probably be "Figures 7 and 8 show ... in wind tunnel and one flight leg of 1000 m (excluding bends), respectively.. ". Some discussion on Fig. 7 should be included in text rather in figure caption, too. In Figure 7 the data and polynomial fits of Eqs. (3) should be shown (e.g. scatter plots of sideslip angle against kβ for one small and one large attack angle) to get an idea of the sensitivity (non-linearity) to noise and the quality of flow angle measurements at such large flow angles. The panels in Fig. 7 are not very useful. Also, in Fig. 8 the M2AV airspeed is less noisy at high frequencies, but on the other hand some low frequency variations observed in MASC have lower amplitude in M2AV (not necessary at high flow angles). Low frequencies are significant for flux measurements.

Page 9790, lines 25-28: Why differential pressure between the two attack angle holes and the differential pressure two sideslip angle holes are not measured directly and possible with less noise? These are the measurements that are actually used in the derivation of flow angles as the authors state too.

Fig. 14: The response of the combined filter which is used drops above 10 Hz. Why not use a filter with higher frequency response? Does measurement noise starts at frequencies just above 10 Hz? Is this limit too low for the purposes of the system (measurement of small scale turbulence)?

Page 9797, line 22: Correct the double full stop.

Fig. 15: The authors should fit the inertial subrange lines to each spectrum (or struc-

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ture function) to have a more clear view of the frequency (or time lag) where it departs from the expected isotropic behavior. The expected entry point of the inertial subrange should be indicated, too. Obviously, more examples are needed (or a composite normalized spectrum) to have a definite conclusion on the improved behavior of M2AV over MASC.

Page 9799, lines 10-11: Flow distortion by the aircraft parts is a crucial issue. Some related references could be included by the authors, as they did for wind calculation equations in the next sentence.

Interactive comment on Atmos. Meas. Tech. Discuss., 6, 9783, 2013.