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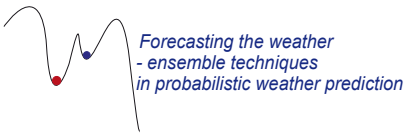

Comparison of Wind Speed Measurement by Sonic and Cup Anemometers

L. Pop

Institute of Atmospheric Physics, Department of Meteorology, Praha, Czech Republic (pop@ufa.cas.cz)

Cup anemometers are traditional in long term wind speed measurement on meteorological stations as well as in case of field experiments. However, these anemometers have slow response to changes of wind speed and direction. This leads to well known “overspeeding effect”, which increase average wind speed in measurement interval. According to published experiments, overestimation of wind speed can be about 10 %. This is very significant for climate characteristic and has essential effect on economic return of wind power plants. This effect depends on inertia of anemometer, thus it is different for different instrumentation occurring in the past of wind measurement in the Czech Republic.

Cup anemometer inertia is even more important in case of extreme values of wind speed. These situations are much less studied than conditions mentioned above. The presented study is aimed at this problem. It is based on synchronous wind speed and direction measurements by two cup and one sonic anemometer on location Dlouhá Louka in the North West of the Czech Republic. Cup anemometers are of different size and thus different inertia. Sonic anemometer has much shorter response than both cup anemometers. It means that comparison was performed between two cup anemometers with different inertia and sonic anemometer with much less inertia. Results were compared with theoretical models. Speed and direction of the wind were measured at height 50 m above surface with short time resolution of 1 second. The measurement was obtained in years 2010 and 2011.